United States
Department of
Agriculture

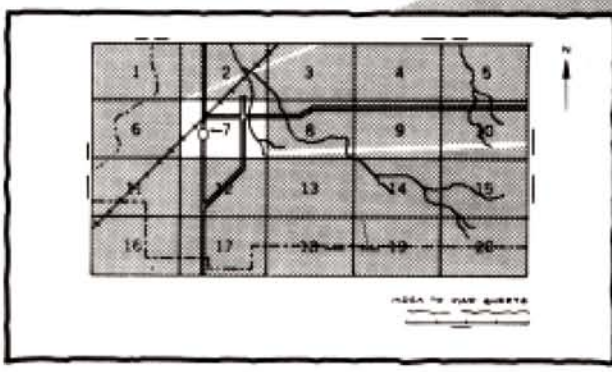
Soil
Conservation
Service

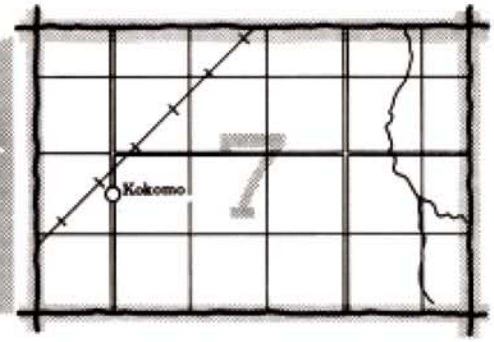
In cooperation with
West Virginia
Agricultural and Forestry
Experiment Station

Soil Survey of Cabell County West Virginia

HOW TO USE

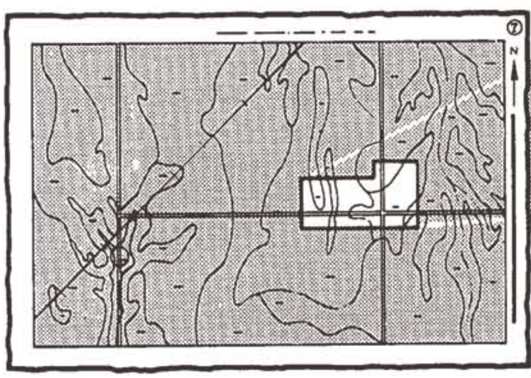
1. Locate your area of interest on the "Index to Map Sheets"

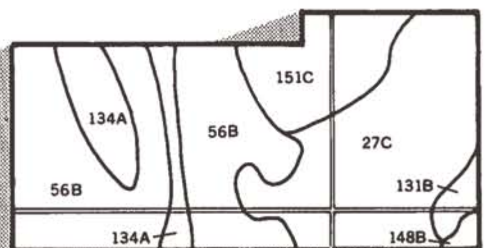




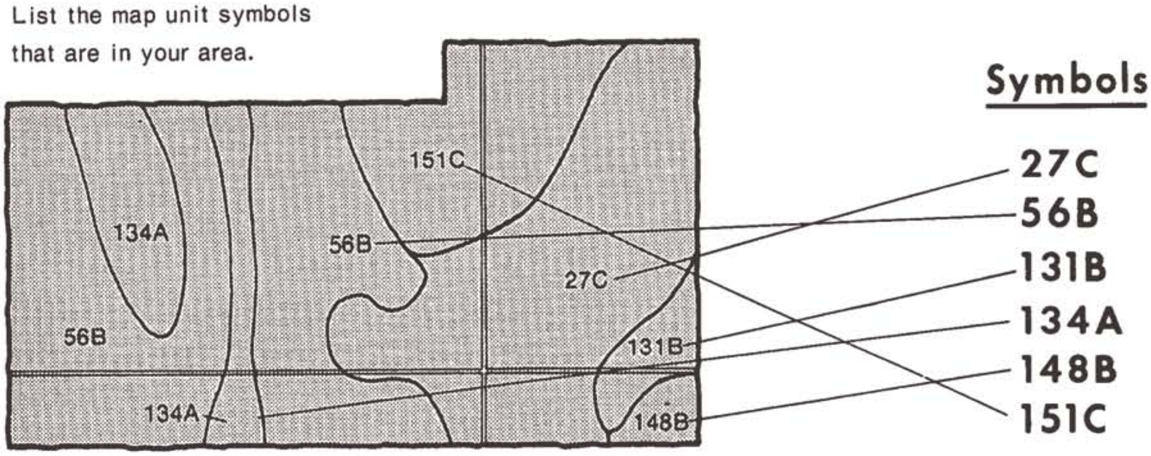
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



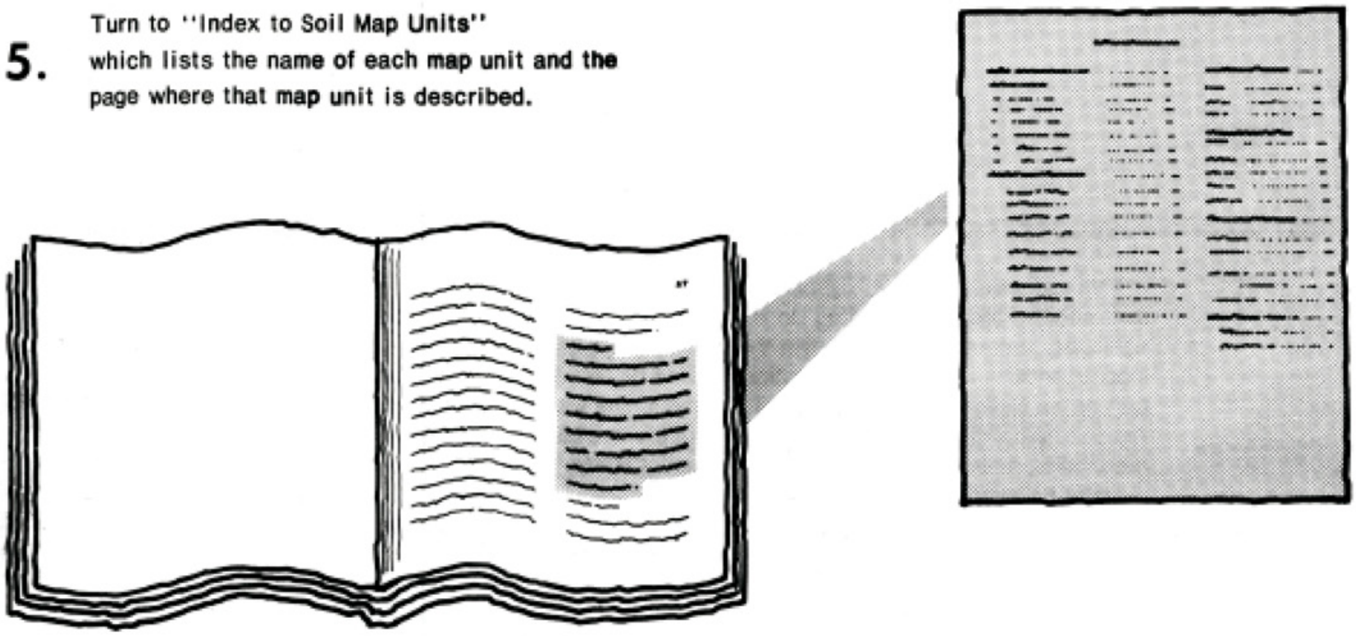


4. List the map unit symbols that are in your area.

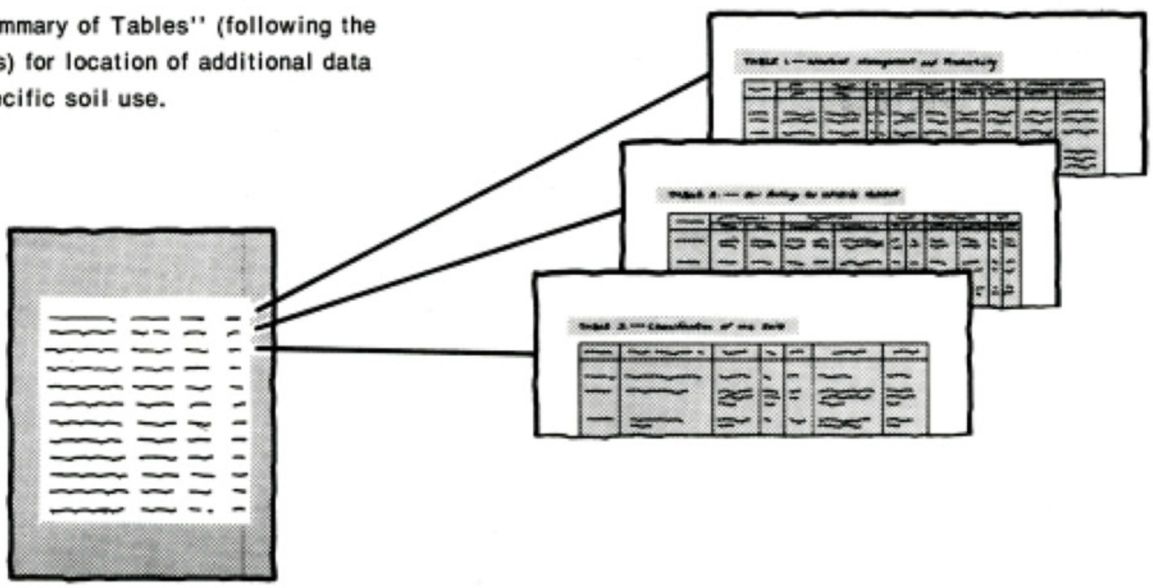


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

This survey provides updated information to a soil survey of Cabell County in the Huntington Area survey of 1911 (*4*), and provides more detailed maps.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the West Virginia Agricultural and Forestry Experiment Station. The survey is part of the technical assistance furnished to the Guyan Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Typical landscape in the Allegheny-Monongahela-Gilpin general soil map unit.

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Soil Series

Issued February 1989

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Cabell County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Rollin N. Swank
State Conservationist
Soil Conservation Service

Soil Survey of Cabell County, West Virginia

By Carlos P. Cole, Soil Conservation Service

Soils surveyed by Carlos P. Cole, Stephen G. Carpenter, Leonard S. Newman, and William F. Hatfield, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
In cooperation with
West Virginia Agricultural and Forestry Experiment Station

CABELL COUNTY is in the western part of West Virginia (fig. 1). The county is 285 square miles, or 182,400 acres. Land covers about 178,140 acres and water about 4,260 acres. The Ohio River is the major river in the county. It flows south forming the border between Ohio and West Virginia. The population of Cabell County in 1980 was 106,835.

Figure 1.—Location of Cabell County in West Virginia.

Huntington is the largest city in the county. The major enterprises are associated with alloys, railroad and mine cars, clothing, steel, chemicals, and other industrial plants and warehouses along the Ohio River and in the Teays Valley.

The transportation needs of Cabell County are served by Federal and State roads, railroads, airports, and barges. Interstate 64 and U.S. Highway 60 run east and west through the central part of the county, and a group of State highways runs north-south through the county. Two major railroads serve the county. They have service yards in Huntington and form routes north along the Ohio River, south along the Guyandotte River, and east through the Teays Valley. Conrail stops in Huntington and travels through the Teays Valley. The Tri-State Airport provides the county with air freight and passenger service. The Ohio River provides barge service for various industries in the area.

General Nature of the County

This section provides information about some of the natural and cultural factors that affect land use in the county.

Settlement

Cabell County was formed in 1809 from a part of Kanawha County. The original area included all of Wayne and Mingo Counties and parts of Logan, Boone, Putnam, and Lincoln Counties. Cabell County was named for William H. Cabell, who was governor of Virginia from 1805 to 1808. The county government was organized by Judge John Coalter in April 1809 in the house of William Merritt at or near Barboursville.

Huntington, the county seat founded by Collis P. Huntington, is one of the largest cities in West Virginia. Rufus Cook, a surveyor, made a map of the new city with the avenues running east and west and the streets running north and south. The other incorporated towns in Cabell County are Barboursville and Milton.

Farming

The 1982 Census of Agriculture reports 451 farms in Cabell County and a total farm acreage of 42,098 (*8*). Between 1974 and 1982, the total acreage of farmland in the county decreased by 7,219 acres and the average-size farm decreased from 95 acres to 93 acres.

The main types of farming in the county are growing tobacco (fig. 2), raising beef cattle, producing grain crops, hay, and pasture, and growing plants in greenhouses. Most farms are operated on a part-time basis.

Relief and Drainage

Cabell County is in the Central Allegheny Plateau Major Land Resource Area. The county is marked by hills and narrow valleys. The northern section has gently sloping to moderately steep, rounded ridgetops. The side slopes are steep and very steep. The central and southern parts of the county are dominated by narrow ridgetops and steep or very steep side slopes that are broken in many areas by less sloping benches.

The valleys of the Guyandotte River, the Mud River, and the Ohio River are dominated by nearly level to gently sloping soils. The ancient Teays River Valley extends through the central part of the county from Culloden to Huntington and consists mainly of gently sloping and strongly sloping soils. The county is drained primarily by the Guyan Creek, the Guyandotte River, the Mud River, and the Ohio River.

Elevation in the county ranges from 1,169 feet above sea level on a ridgetop near the Wayne County line in the southern part of the county to 515 feet above sea level at normal pool elevation on the Ohio River.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Winters in the county are cold and have a moderate amount of snow. Intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on hillsides and very warm in the valleys. Rainfall is evenly distributed throughout the year, and the normal annual precipitation is adequate for all crops grown in the county.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Huntington in the period 1961 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 34 degrees F, and the average daily minimum temperature is 25 degrees. The lowest temperature on record, which occurred at Huntington on January 24, 1963, is -15 degrees. In summer the average temperature is 73 degrees, and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred at Huntington on August 3, 1964, is 100 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 41 inches. Of this, 23 inches, or 55 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 3.07 inches at Huntington on July 1, 1962. Thunderstorms occur on about 44 days each year, and most occur in summer.

The average seasonal snowfall is 26 inches. The greatest snow depth at any one time during the period of record was 20 inches. On the average, 21 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 45 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 8 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Figure 2.—Tobacco on Sensabaugh loam, 3 to 8 percent slopes, rarely flooded.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

In some areas of the general soil map that join the maps of Mason and Putnam Counties, there are differences in map unit names and proportions of the soils. The differences are the result of differences in map scale and degree of generalization.

Soil Descriptions

1. Ashton-Huntington-Melvin

Very deep, nearly level and gently sloping, well drained and poorly drained soils formed in silty alluvium; on flood plains

This map unit consists of soils on low and high flood plains along the Ohio River. The unit has an undulating surface that grades from a higher elevation near the hills to a lower elevation near the river. The soils are dissected by drainageways that empty into the Ohio River. Slope ranges from 0 to 8 percent.

This map unit makes up about 2 percent of the survey area. The unit is about 23 percent Ashton soils, 11 percent Huntington soils, 11 percent Melvin soils, and 55 percent soils of minor extent.

The Ashton soils are well drained and nearly level and gently sloping. They are on high flood plains. They have a very dark grayish brown, medium-textured surface layer and a dark brown and strong brown, medium-textured subsoil. These Ashton soils formed in alluvial material washed from acid and limy soils on uplands.

The Huntington soils are well drained and nearly level. They are on low flood plains. They have a very dark grayish brown, medium-textured surface layer and a dark brown and dark yellowish brown, medium-textured subsoil. These Huntington soils formed in alluvial material washed from acid and limy soils on uplands.

The Melvin soils are poorly drained and nearly level. They are in low areas and depressions on flood plains. They have a dark brown, medium-textured surface layer and a dark grayish brown, medium-textured subsoil. These Melvin soils formed in alluvial material washed from acid and limy soils on uplands.

Of minor extent in this map unit are well drained Chagrin and Sensabaugh soils and moderately well drained Lindside soils on flood plains; excessively well drained Lakin soils, well drained Wheeling soils, and moderately well drained Cotaco soils on terraces; well drained Vandalia soils on foot slopes; and small areas of Urban land and Udorthents mainly along West Virginia Route 2.

Most of the acreage of this map unit is used for corn, tobacco, soybeans, and garden truck crops. A few areas are used for hay and pasture. Some areas are used for urban and industrial development, most of which has taken place in recent years.

This map unit is suited to cultivated crops, hay, and pasture. The hazard of erosion is slight or moderate. If cultivated crops are grown continuously, the soil needs the protection of a cover crop. Flooding sometimes damages crops, but most of the flooding is during the winter or early spring, before crops are planted.

The soils in this map unit are suitable for trees, but only a small acreage is wooded. A seasonal high water table restricts the use of logging equipment on the Melvin soils.

The soils in this map unit and their limitations for community development are: Ashton soils—flooding and low soil strength; Huntington soils—flooding and moderate frost action; Melvin soils—flooding, seasonal high water table, and low strength; soils of minor extent—flooding, seasonal high water table, high frost action, low strength, poor filter, slow permeability, slope, high shrink-swell potential, and slip hazard.

2. Allegheny-Monongahela-Gilpin

Very deep, deep, and moderately deep, gently sloping to steep, well drained and moderately well drained soils *formed in loamy alluvium or residuum; on terraces*

This map unit consists of alluvial soils on high stream terraces and residual soils on terrace side slopes mostly in the Teays Valley. The Mud River, the Guyandotte River, and some smaller streams cut through the terrace areas. Slope ranges from 3 to 35 percent.

This map unit makes up about 5 percent of the survey area. The unit is about 20 percent Allegheny soils, 15 percent Monongahela soils, 14 percent Gilpin soils, and 51 percent soils of minor extent.

The Allegheny soils are deep, well drained, and strongly sloping. They are on high stream terraces. These soils have a dark grayish brown, medium-textured surface layer and a yellowish brown and strong brown, moderately fine-textured, medium-textured, and moderately coarse-textured subsoil. These Allegheny soils formed in alluvial material washed from acid soils on uplands.

The Monongahela soils are very deep, moderately well drained, and gently sloping to strongly sloping. They are on high stream terraces. These soils have a brown, medium-textured surface layer and a brownish yellow and light yellowish brown, medium-textured subsoil. The Monongahela soils formed in alluvial material washed from acid soils on uplands.

The Gilpin soils are moderately deep, well drained, and strongly sloping to steep. They are on the dissected terrace side slopes. These soils have a dark grayish brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured subsoil. These Gilpin soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

Of minor extent in this map unit are well drained Chagrin and Sensabaugh soils and moderately well drained Lobdell soils on flood plains; well drained Kanawha soils, moderately well drained Cotaco and Markland soils, and somewhat poorly drained Guyan soils on high flood plains and low stream terraces; moderately well drained Dormont soils on foot slopes; well drained Upshur soils on terrace side slopes; and small areas of Urban land and Udorthents mainly along Interstate 64 and in the urbanized areas.

Most of the acreage of this map unit is used for cultivated crops, hay, or pasture or for urban development, most of which has taken place recently.

The gently sloping and strongly sloping high stream terraces are suited to cultivated crops, hay, and pasture. The hazard of erosion is moderate or severe in unprotected areas and is a management concern. If cultivated crops are grown, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil help to control erosion and maintain fertility and tilth.

The soils in this map unit are suitable for trees, but only a small acreage is wooded. The seasonal high water table restricts the use of logging equipment on the Monongahela soils.

The soils in this map unit and their limitations for community development are: Allegheny soils—slope; Monongahela soils—seasonal high water table, slow permeability, slope, and low strength; Gilpin soils—slope and depth to bedrock; soils of minor extent—occasional or rare flooding, seasonal high water table, slow permeability, slip hazard, slope, low strength, high shrink-swell potential, and high frost action.

3. Kanawha-Chagrin-Guyan

Very deep, nearly level and gently sloping, well drained and somewhat poorly drained soils formed in loamy alluvium; on flood plains and terraces

This map unit is along the Guyan Creek, the Guyandotte River, and the Mud River. It consists of narrow flood plains adjacent to the stream, wider and higher flood plains adjacent to the hills, and low terraces above the flood plains. Slope ranges from 0 to 8 percent.

This map unit makes up about 7 percent of the survey area. The unit is about 18 percent Kanawha soils, 14 percent Chagrin soils, 8 percent Guyan soils, and 60 percent soils of minor extent.

The Kanawha soils are well drained and nearly level and gently sloping. They are on high flood plains and low terraces. These soils have a dark brown, medium-textured surface layer and a yellowish brown, medium-textured subsoil. These Kanawha soils formed in alluvial material washed from acid and limy soils on uplands.

The Chagrin soils are well drained and nearly level. They are on low flood plains. These soils have a very dark grayish brown or dark brown, medium-textured surface layer and a very dark gray and yellowish brown or brown and strong brown, medium-textured subsoil. These Chagrin soils formed in alluvial material washed from acid and limy soils on uplands.

The Guyan soils are somewhat poorly drained and nearly level. They are on low stream terraces. These soils have a grayish brown, medium-textured surface layer and a light yellowish brown, brownish yellow, strong brown, and light gray, medium-textured and moderately fine-textured subsoil. These Guyan soils formed in alluvial material washed from acid soils on uplands.

Of minor extent in this map unit are well drained Pope and Sensabaugh soils and moderately well drained Lobdell soils on flood plains; well drained Allegheny soils and moderately well drained Cotaco, Markland, and Monongahela soils on terraces; well drained Vandalia soils and moderately well drained Dormont soils on foot slopes; well drained Gilpin soils and Upshur soils on uplands; and areas of Urban land and Udorthents mainly in the urbanized parts of the county.

Most of the acreage of this map unit is used for cultivated crops, hay, or urban development. A few areas are used for pasture. The urban development is mostly in the areas of Barboursville and Milton.

This map unit is suited to cultivated crops, hay, and pasture. The hazard of erosion is slight or moderate. If cultivated crops are grown continuously, the soils need the protection of a cover crop. Flooding of the low flood-plain soils sometimes damages crops, but most of the flooding is during the winter or early spring, before crops are planted.

The soils in this map unit are suitable for trees, but very little of the acreage is wooded. The seasonal high water table restricts the use of logging equipment on the Guyan soils.

The soils in this map unit and their limitations for community development are: Kanawha soils—flooding, low strength, and moderate frost action; Chagrin soils—flooding; Guyan soils—seasonal high water table, low strength, and high frost action; soils of minor extent—flooding, seasonal high water table, slow permeability, slip hazard, slope, depth to bedrock, high shrink-swell potential, low strength, and high frost action.

4. Urban land-Wheeling-Ashton

Urban land and very deep, nearly level and gently sloping, well drained soils formed in loamy and silty alluvium; on flood plains and terraces

This map unit consists of Urban land and soils on high flood plains and low terraces along the Guyandotte River and the Ohio River. This unit is in the more urbanized part of the survey area in and adjacent to the city of Huntington. Slope ranges from 0 to 8 percent.

This map unit makes up about 3 percent of the survey area. The unit is about 70 percent Urban land, 8 percent Wheeling soils, 5 percent Ashton soils, and 17 percent soils of minor extent.

Urban land consists of buildings, streets, parking lots, and other urban structures in residential, commercial, and industrial areas.

The Wheeling soils are nearly level and gently sloping. They are on low stream terraces. These soils have a dark brown, medium-textured surface layer and a yellowish brown and dark yellowish brown, medium-textured and moderately coarse-textured subsoil. These Wheeling soils formed in alluvial material washed from acid and limy soils on uplands.

The Ashton soils are nearly level. They are on high flood plains. These soils have a very dark grayish brown, medium-textured surface layer and a dark brown and strong brown, medium-textured and moderately fine-textured subsoil. These Ashton soils formed in alluvial material washed from acid and limy soils on uplands.

Of minor extent on flood plains and low terraces in this map unit are well drained Chagrin, Huntington, Lakin, and Sensabaugh soils; moderately well drained Cotaco, Lindside, and Markland soils; somewhat poorly drained Guyan soils; and poorly drained Melvin soils. Also of minor extent are well drained Vandalia soils and moderately well drained Dormont soils on foot slopes and areas of Udorthents and water.

The acreage of this map unit is used for residential, commercial, and industrial development.

This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this map unit is used for urban development. The open areas are used mostly for lawns.

The soils in this map unit and their limitations for community development are: Wheeling soils—low strength and moderate frost action; Ashton soils—low strength; soils of minor extent—seasonal high water table, high frost action, low strength, slow permeability, high shrink-swell potential, and slip hazard. Most of this map unit is protected from flooding by the flood wall around Huntington, and sewage disposal is done mainly through the use of municipal facilities.

5. Gilpin-Upshur

Moderately deep and deep, strongly sloping to very steep, well drained soils formed in residuum; on uplands

This map unit consists of soils on uplands in the northern and central parts of the county. It is a wide ridgetop with a "bench-and-break" landscape on the hillsides (fig. 3). The steep and very steep hillsides are separated in many areas by strongly sloping and moderately steep benches. The unit is dissected by many small drainageways. Slope ranges from 8 to 65 percent.

This map unit makes up about 65 percent of the survey area. The unit is about 45 percent Gilpin soils, 17 percent Upshur soils, and 38 percent soils of minor extent.

The Gilpin soils are moderately deep and strongly sloping to very steep. They are on hillsides and ridgetops. These soils have a dark grayish brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured subsoil. These Gilpin soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

The Upshur soils are deep and strongly sloping to very steep. They are on hillsides and ridgetops. These soils have a dark brown, medium-textured or moderately fine-textured surface layer and a reddish brown and weak red, fine-textured subsoil. These Upshur soils formed in limy material weathered from clay shale.

Of minor extent in this map unit are well drained Chagrin and Sensabaugh soils and moderately well drained Lobdell soils on flood plains, well drained Vandalia soils and moderately well drained Dormont soils on foot slopes, and well drained Lily soils and moderately well drained Coolville soils on upland ridgetops.

About 60 percent of the soils on ridgetops and foot slopes and nearly all the soils on flood plains have been cleared and used for cultivated crops, hay, or pasture. The cultivated crops are tobacco, corn, and garden crops. The steep and very steep hillsides are mostly

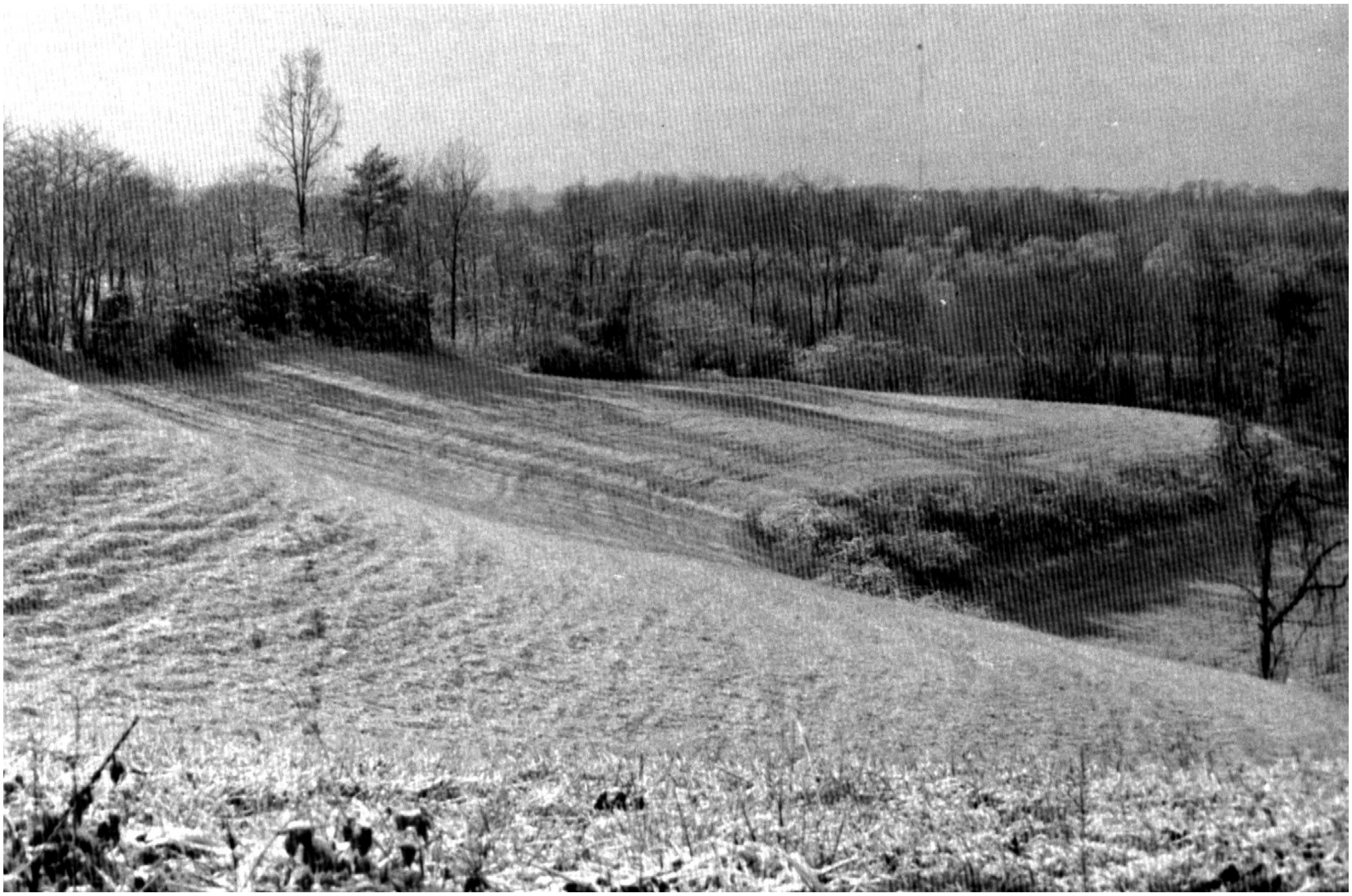

Figure 3.—A bench-and-break landscape in the Gilpin-Upshur general soil map unit.

wooded; a small amount is used for pasture. Some of the ridgetops and flood plains near Huntington and the Teays Valley are used for residential areas.

This map unit is generally unsuited to cultivated crops.

Slope and the hazard of erosion are the main limitations of this map unit for hay and pasture. Prevention of overgrazing is the main management concern on pastures on the strongly sloping to very steep soils, and maintaining a ground cover is needed to help prevent erosion in those areas.

The soils in this map unit are suitable for trees, and much of the acreage is wooded. Slope and rock outcrops restrict the use of equipment on this map unit. The use of equipment is also restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion.

The soils in this unit and their limitations for community development are: Gilpin soils—slope and depth to bedrock; Upshur soils—slope, slow permeability, high shrink-swell potential, and slip hazard; soils of minor extent—occasional and rare flooding, slope, slip hazard, seasonal high water table, slow permeability, high shrink-swell potential, low strength, and high frost action.

6. Gilpin

Moderately deep, strongly sloping to very steep, well drained soils formed in residuum; on uplands

This map unit is on uplands in the southern part of the county. This unit consists of strongly sloping and steep, narrow ridgetops and very steep hillsides with moderately steep foot slopes. The landscape is dissected by many small drainageways. Slope ranges from 8 to 65 percent.

This map unit makes up about 18 percent of the survey area. The unit is about 83 percent Gilpin soils and 17 percent soils of minor extent.

The Gilpin soils are on hillsides and ridgetops. These soils have a dark grayish brown, medium-textured surface layer and a yellowish brown and strong brown, medium-textured subsoil. These Gilpin soils formed in acid material weathered from interbedded siltstone, shale, and sandstone.

Of minor extent on flood plains in this map unit are well drained Chagrin and Sensabaugh soils and moderately well drained Lobdell soils. Of minor extent on upland ridgetops are well drained Lily soils and moderately well drained Coolville soils.

Most of this map unit is wooded. Most of the flood plains have been cleared and used for hay or cultivated crops. The residential areas are mostly on foot slopes and flood plains.

Slope makes this map unit generally unsuited to cultivated crops. The soils on strongly sloping and moderately steep benches, ridgetops, and foot slopes are suited to hay and pasture, but most of those areas are wooded. Slope and the hazard of erosion are the main limitations of this map unit for hay and pasture. Prevention of overgrazing is the main management concern on pastures on the strongly sloping to very steep soils, and maintaining a ground cover in those areas helps to prevent erosion.

The soils in this map unit are suitable for trees. Slope, stones on the surface, and rock outcrops restrict the use of equipment in this unit. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails on the contour helps to control this erosion.

The soils in this map unit and their limitations for community development are: Gilpin soils—slope and depth to bedrock; soils of minor extent—occasional and rare flooding, slip hazard, seasonal high water table, slope, moderately slow and slow permeability, high shrink-swell potential, high frost action, and low strength.

Detailed Soil Map Units

Dr. John Sencindiver, associate professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, assisted with the preparation of this section.

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Kanawha loam, 0 to 3 percent slopes, protected, is one of several phases in the Kanawha series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Gilpin-Upshur complex, 15 to 25 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Urban land is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

AgC—Allegheny loam, bedrock substratum, 8 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on high stream terraces mostly in the Teays Valley. This soil is moderately eroded.

Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is 28 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The next 16 inches is strong brown clay loam. The lower 6 inches is strong brown sandy loam. The substratum is strong brown sandy loam that extends to shale and siltstone bedrock at a depth of 50 inches.

Included with this soil in mapping are a few small areas of moderately well drained Monongahela soils, somewhat poorly drained Guyan soils, and well drained Gilpin and Upshur soils. Also included are a few small areas of soils that have a surface layer of silt loam, soils that have a subsoil of loamy sand, and soils with slopes of less than 8 percent or more than 15 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Allegheny soil is moderate or high. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is 40 to 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. The hazard of erosion is severe in unprotected areas and is a management concern. If this soil is cultivated, conservation tillage, crops in contour strips, a crop sequence that includes hay, a cover crop, and crop residue on and in the soil help to control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope, the depth to bedrock, and frost action are the main limitations of this soil for most urban uses.

Land shaping and grading help to overcome slope as a limitation of the soil as a site for dwellings. Erosion is a hazard in areas cleared for construction. Designing dwellings so that they conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and the depth to bedrock are the main limitations of this soil as a site for septic tank absorption fields. Land shaping and placing the lines of the disposal field on the contour or across the slope will help overcome the slope limitation. A larger absorption field will help overcome the bedrock limitation in some areas.

Slope and frost action are the main limitations of this soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome the slope. Using coarse-grained subgrade or base material will help overcome the frost action.

Slope, a seasonal high water table, slow permeability, a high shrink-swell potential, the depth to bedrock, and low soil strength limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The deep, well drained included soils on slopes of less than 8 percent have few limitations for most urban uses.

The capability subclass is IIIe.

AhC—Allegheny, bedrock substratum-Urban land complex, 3 to 15 percent slopes. This unit consists of deep, gently sloping to strongly sloping, well drained soils and areas covered by buildings, streets, parking lots, and other urban structures. It is on high stream terraces mostly in the western and central parts of the Teays Valley. The unit is about 40 percent Allegheny soil, 40 percent urban areas, and 20 percent other soils. The areas of Allegheny soil and the urban areas are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Allegheny soil is dark grayish brown loam about 8 inches thick. The subsoil is 28 inches thick. The upper 6 inches of the subsoil is yellowish brown loam. The next 16 inches is strong brown clay loam. The lower 6 inches is strong brown sandy loam. The substratum is strong brown sandy loam that extends to shale and siltstone bedrock at a depth of 50 inches.

Included with this complex in mapping are a few small areas of moderately well drained Monongahela soils, somewhat poorly drained Guyan soils, and well drained Gilpin and Upshur soils. Also included are soils that have a subsoil of loamy sand, soils with slopes of less than 3 percent or more than 15 percent, and a few small areas of Udorthents.

The available water capacity of the Allegheny soil is moderate or high. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid to extremely acid. Depth to bedrock is 40 to 60 inches.

This unit is not suited to cultivated crops, hay, pasture, or woodland. Most areas are used for urban development. Open areas are used mostly for lawns and a few home gardens.

Slope, the depth to bedrock, and frost action are the main limitations of the soil for most urban uses.

Land shaping and grading help to overcome slope as a limitation of the soil as a site for dwellings. Erosion is a hazard in areas cleared for construction. Designing dwellings so that they conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and the depth to bedrock are the main limitations of this soil as a site for septic tank absorption fields. Land shaping and placing the lines of the disposal field on the contour or across the slope will help overcome the slope limitation. A larger absorption field will help overcome the bedrock limitation in some areas.

Slope and frost action are the main limitations of this soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome the slope. Using coarse-grained subgrade or base material will help overcome the frost action.

Slope, a seasonal high water table, slow permeability, a high shrink-swell potential, the depth to bedrock, and low soil strength limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The deep, well drained included soils on slopes of less than 8 percent have few limitations for most urban uses.

This unit is not assigned to a capability subclass.

AsA—Ashton silt loam, 0 to 3 percent slopes. This soil is very deep, nearly level, and well drained. It is on high flood plains along the Ohio River. This soil is subject to rare flooding.

Typically, the surface layer is very dark grayish brown silt loam about 10 inches thick. The subsoil is 40 inches thick. The upper 16 inches of the subsoil is dark brown silt loam. The next 13 inches is strong brown silty clay loam. The lower 11 inches is dark brown silt loam. The substratum is dark brown silt loam and thin layers of loam and sandy loam, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Huntington and Wheeling soils, moderately well drained Cotaco and Lindside soils, and poorly drained Melvin soils. Also included are a few small areas of soils similar to this Ashton soil but that have a surface layer of loam and a subsoil of loam or have slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Ashton soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is more than 60 inches.

This soil is well suited to cultivated crops and to hay and pasture. Most areas are used for corn, soybeans, or truck crops. Rare flooding in late winter and early spring generally does not damage crops. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Using crop residue in and on the soil helps to maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded, mostly along the banks of the Ohio River and in small isolated areas. These areas are generally not large enough for commercial wood production. This soil has few limitations for woodland management.

The rare flooding and low soil strength are the main limitations of this soil for most urban uses.

The flooding is the main limitation of this soil as a site for dwellings and septic tank absorption fields. The flooding and low soil strength are the main limitations for local roads and streets. Using raised fill over a coarse-grained subgrade or base material will help overcome the effects of flooding and low soil strength on the roads and streets.

A seasonal high water table, occasional flooding, low strength, high frost action, and slope limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The well drained included soils that are not flooded have few limitations for most urban uses.

The capability class is I.

AsB—Ashton silt loam, 3 to 8 percent slopes. This soil is very deep, gently sloping, and well drained. It is on high flood plains along the Ohio River. This soil is subject to rare flooding.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is 38 inches thick. The upper 15 inches of the subsoil is dark brown silt loam. The next 12 inches is strong brown silty clay loam. The lower 11 inches is dark brown silt loam. The substratum is dark brown silt loam and thin layers of loam and sandy loam, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Huntington and Wheeling soils, moderately well drained Cotaco and Lindside soils, and poorly drained Melvin soils. Also included are a few small areas of soils similar to this Ashton soil but that have a surface layer and subsoil of loam and soils with slopes of less than 3 percent or more than 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Ashton soil is high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. Rare flooding in late winter and early spring generally does not damage crops. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil will help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded, mostly along the banks of the Ohio River and in small isolated areas. These areas are generally not large enough for commercial wood production. This soil has few limitations for woodland management.

The rare flooding and low soil strength are the main limitations of this soil for most urban uses.

The flooding is the main limitation of this soil as a site for dwellings and septic tank absorption fields. The flooding and low soil strength are the main limitations for local roads and streets. Using raised fill over a coarse-grained subgrade or base material will help overcome the effects of flooding and low soil strength on the roads and streets.

A seasonal high water table, occasional flooding, low soil strength, high frost action, and slope limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The well drained included soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIe.

Ca—Chagrin silt loam, occasionally flooded. This soil is very deep, nearly level, and well drained. It is on flood plains along the Mud River and smaller streams throughout the county. This soil is subject to occasional flooding generally during winter and spring, before crops are planted. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 8 inches thick. The subsoil is about 33 inches thick. The upper 8 inches of the subsoil is brown silt loam, and the lower 25 inches is strong brown silt loam and loam. The substratum is brown loam to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Kanawha, Pope, and Sensabaugh soils and moderately well drained Lobdell soils. Also included are a few small areas of Chagrin soils with a surface layer of loam, soils with slopes of 3 to 8 percent, soils subject to frequent flooding, and soils subject to rare flooding. Included soils make up about 15 percent of this map unit.

The available water capacity of this Chagrin soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is neutral to medium acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for farming. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Working the crop residue into the soil helps to maintain fertility and tilth. Flooding of this soil generally occurs in winter and early spring, but if late spring or summer flooding occurs, crops will be severely damaged. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management.

Occasional flooding is the main limitation of this soil as a site for dwellings, septic tank absorption fields, and local roads and streets. Using raised fill material will help to overcome the effects of flooding on the roads and streets.

A seasonal high water table, occasional and rare flooding, low soil strength, and high frost action limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The included Kanawha and Sensabaugh soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIw.

Cg—Chagrin loam, overwash, occasionally flooded. This soil is very deep, nearly level, and well drained. Typically, the surface is covered by flood-deposited overwash that has a high content of small coal particles. The soil is on flood plains along the Guyandotte River. The R.D. Bailey Dam on the Guyandotte River has reduced the frequency of flooding to occasional, generally during winter and spring and before crops are planted. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown and very dark gray loam about 16 inches thick. The subsoil is about 26 inches thick. The upper 6 inches of the subsoil is very dark gray and yellowish brown loam, and the lower 20 inches is yellowish brown fine sandy loam. The substratum is yellowish brown fine sandy loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Kanawha, Pope, and Sensabaugh soils and moderately well drained Dormont and Lobdell soils. Also included are a few areas of Chagin soils with a surface layer of silt loam, soils with slopes of 3 to 8 percent, steep and very steep soil escarpments, soils subject to frequent flooding, and soils subject to rare flooding. Included soils make up about 25 percent of this map unit.

The available water capacity of this Chagrin soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is neutral to medium acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Much of it is used for farming. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Weathering of the coal fragments in the surface layer causes high acidity in some areas of the soil, and lime is needed in those areas to neutralize the acidity. Working crop residue into the soil helps to maintain fertility and tilth. Occasional flooding generally occurs in winter and spring, but if late spring or summer flooding occurs, crops will be severely damaged. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and about one-third to one-half of the acreage is wooded. This soil has few limitations for woodland use and management, but erosion on logging roads and skid trails along the soil escarpment is a management concern. Locating roads and skid trails close to the contour in these areas will help to control erosion.

Occasional flooding is the main limitation of this soil as a site for dwellings, septic tank absorption fields, and local roads and strees. Using raised fill material will help to overcome the effects of flooding on the roads and streets.

A seasonal high water table, occasional and rare flooding, low soil strength, and high frost action limit the included soils as sites for dwellings, septic tank absorption fields, and local roads and streets. The included Kanawha and Sensabaugh soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIw.

Cm—Chagrin-Melvin silt loams, frequently flooded. This unit consists of very deep, nearly level soils on flood plains along backwater tributaries to the Ohio River. These soils are subject to frequent flooding. The soil surface is normally covered with ponded floodwater for extended periods in late winter and in spring. The overflow water from the Ohio River litters the surface with trash and driftwood. The unit is about 40 percent well drained Chagrin soils, 25 percent poorly drained Melvin soils, and 35 percent other soils. The soils are so intermingled that it was not practical to map them separately.

Typically, the surface layer of the Chagrin soil is dark brown silt loam about 8 inches thick. The subsoil is about 33 inches thick. The upper 8 inches of the subsoil is brown silt loam, and the lower 25 inches is strong brown silt loam and loam. The substratum is brown loam to a depth of 60 inches or more.

Typically, the surface layer of the Melvin soil is dark brown silt loam mottled with strong brown and dark grayish brown. It is about 9 inches thick. The subsoil is about 18 inches thick. It is dark grayish brown silt loam mottled with strong brown. The substratum is gray and grayish brown silty clay loam mottled with strong brown. It extends to a depth of 60 inches or more.

Included with these soils in mapping are a few small areas of well drained Ashton, Huntington, and Sensabaugh soils and moderately well drained Lindside soils. Also included are a few small areas of very poorly drained soils, soils subject to occasional flooding, and Udorthents.

The available water capacity of the Chagrin soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is neutral to medium acid. The depth to bedrock is more than 60 inches.

The available water capacity of the Melvin soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate or high. Where unlimed, the soil ranges from medium acid to neutral in the surface layer and upper part of the subsoil and is slightly acid or neutral in the lower part of the subsoil and in the substratum. This Melvin soil has a seasonal high water table at or near the surface that restricts the root zone for many plants. The depth to bedrock is more than 60 inches.

These soils are generally not suited to cultivated crops or hay because of the frequent flooding. They are suited to pasture, but the Melvin soil needs drainage. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soils are reasonably firm are major pasture management needs.

These soils have moderately high potential productivity for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft or is covered with backwater from the Ohio River.

The frequent flooding of the Chagrin soil and the frequent flooding, low soil strength, and seasonal high water table of the Melvin soil are the main limitations for most urban uses.

A seasonal high water table, occasional and rare flooding, low soil strength, and high frost action limit the included soils for most urban uses.

The capability subclass is Vw.

CoB—Coolville silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on broad ridgetops mostly in the northern part of the county (fig. 4).

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 32 inches thick. The upper 9 inches of the subsoil is yellowish brown silt loam. The next 8 inches is light olive brown silty clay loam mottled with light gray and strong brown. The next 8 inches is red silty clay mottled with pinkish white. The lower 7 inches is reddish gray and strong brown silty clay mottled with red. The substratum is light gray silty clay mottled with brownish yellow, and it extends to soft, light gray shale bedrock at a depth of about 55 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Upshur soils. Also included are soils similar to this Coolville soil but that have a surface layer of loam, soils with a subsoil of silt loam and a firm layer at a depth of about 24 inches, and soils with slopes of less than 3 percent or more than 8 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Coolville soil is high. Permeability is slow in the subsoil. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is medium acid to extremely acid in the surface layer, strongly acid to extremely acid in the upper part of the subsoil, and strongly acid or very strongly acid in the lower part of the subsoil and in the substratum. This soil has a seasonal high water table about 1.5 to 3 feet below the surface that restricts the root zone for some plants. The depth to bedrock is 40 to 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil will help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft.

The seasonal high water table, slow permeability, low soil strength, and high frost action are the main limitations of this soil for most urban uses.

The high water table is the main limitation of this soil as a site for dwellings. Installing foundation drains, sealing foundations, and backfilling with porous material will help to overcome the water table.

The high water table and the slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field, a drainage system around the filter field to lower the seasonal high water

Figure 4.—An area of Coolville silt loam, 3 to 8 percent slopes.

table, a better suited soil, or an alternate system will help overcome those limitations.

High frost action and low soil strength are the main limitations of this soil as a site for local roads and streets. Using coarse-grained subgrade to frost depth and installing surface and subsurface drainage systems will help to prevent the damage to pavement caused by frost action and low strength.

Slope, depth to bedrock, high shrink-swell potential, slow permeability, and low soil strength are the main limitations of the included soils for most urban uses.

The capability subclass is IIe.

CtB—Cotaco silt loam, 3 to 8 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on low stream terraces along the Ohio River, the Mud River, and the Guyandotte River.

Typically, the surface layer is dark brown silt loam about 15 inches thick. The subsoil is about 30 inches thick. The upper 10 inches of the subsoil is yellowish brown loam mottled with light gray. The next 14 inches is yellowish brown clay loam mottled with light gray. The lower 6 inches is yellowish brown and brown loam mottled with light gray. The substratum is yellowish brown and brown loam mottled with light gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Kanawha and Wheeling soils, moderately well drained Markland soils, and somewhat poorly drained Guyan soils. Also included are Cotaco soils with a surface layer of loam, soils with a subsoil of silt loam, soils subject to rare flooding, and soils with less than 3 percent slope. Included soils make up about 25 percent of this map unit.

The available water capacity of this Cotaco soil is moderate or high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid. This soil has a seasonal high water table about 1.5 to 2.5 feet below the surface that restricts the root zone for some plants. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. Artificial drainage will help improve the suitability of this soil for cultivated crops, and providing drainage is a major management concern. The hazard of erosion is moderate in unprotected areas and is also a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil will help control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Most of the trees are in small isolated areas around the edges of crop fields or between urban areas, and are generally too small for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

The seasonal high water table and high frost action are the main limitations of this soil for most urban uses.

The high water table is the main limitation of this soil as a site for dwellings. Installing foundation drains, sealing foundations, and backfilling with porous material will help to overcome the wetness limitation.

The high water table is the main limitation of this soil as a site for septic tank absorpton fields. A drainage system around the filter field to lower the seasonal high water table, a better suited soil, or an alternate system will help to overcome this limitation.

The high water table and frost action are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Using raised fill of coarse-grained subgrade to frost depth and installing surface and subsurface drainage systems will help to overcome the limitations.

A seasonal high water table, high shrink-swell potential, high frost action, low soil strength, slow permeability, and rare flooding limit the included soils for most urban uses. The included Kanawha and Wheeling soils have few limitations for these uses.

The capability subclass is IIe.

DoD—Dormont silt loam, loamy substratum, 15 to 25 percent slopes. This soil is very deep, moderately steep, and moderately well drained. It commonly has seeps and wet-weather springs and is subject to slippage. It is on foot slopes, in upland drainageways, and in coves in the central and southern parts of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 45 inches thick. The upper 14 inches of the subsoil is yellowish brown gravelly silty clay loam. The next 16 inches is brownish yellow and yellowish brown very channery and channery silty clay loam mottled with light gray. The lower 15 inches is yellowish brown and reddish brown channery silty clay loam mottled with light gray. The substratum is yellowish brown channery clay loam mottled with light gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few areas of well drained Gilpin, Sensabaugh, Upshur, and Vandalia soils and moderately well drained Lobdell soils. Also included are areas of bedrock escarpments, areas where stones cover 1 to 3 percent of the surface, and soils with slopes of less than 15 percent or more than 25 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Dormont soil is high. Permeability is moderately slow in the subsoil. Runoff is rapid, and natural fertility is moderate. Where unlimed, the soil ranges from very strongly acid to medium acid in the surface layer and upper part of the subsoil and is strongly acid or medium acid in the lower part of the subsoil and in the substratum. This soil has a seasonal high water table about 1.5 to 3 feet below the surface which restricts the root zone for some plants. The depth to bedrock is more than 60 inches.

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. Most open areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. The seeps and springs limit the suitability and stability of this soil for cultivated crops and hay unless artificial drainage is provided. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil will help control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, and about two-thirds of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

The seasonal high water table, slope, moderately slow permeability, slip hazard, and low soil strength are the main limitations of this soil for most urban uses.

Slope, the high water table, and the slip hazard are the main limitations of this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with porous materials will help to overcome the wetness limitation. Installing foundations on a stable soil or bedrock and installing an interceptor drainage system to help reduce ground-water flow through the soil will help to reduce the slip hazard.

Constructing dwellings to fit the natural landscape and avoiding unnecessary land disturbance reduces the slip hazard in some areas. Erosion is a hazard in areas cleared for construction, and establishing a plant cover during or soon after construction helps to reduce this erosion.

Slope, the high water table, the moderately slow permeability, and the slip hazard are the main limitations of this soil as a site for septic tank absorption fields. An alternate system or a better suited soil will help overcome the limitations.

Low soil strength, slope, and the slip hazard are the main limitations of this soil as a site for local roads and streets. Avoiding unnecessary soil disturbance helps to reduce the slip hazard. Constructing roads and streets on the contour over coarse-grained subgrade and installing a surface and subsurface drainage system will help to overcome the limitations.

A seasonal high water table, slope, slow permeability, slip hazard, occasional and rare flooding, low soil strength, high shrink-swell potential, high frost action, and depth to bedrock limit the included soils for most urban uses. The included Sensabaugh soils that are rarely flooded have few limitations for these uses.

The capability subclass is IVe.

GlC—Gilpin silt loam, 8 to 15 percent slopes. This soil is moderately deep, strongly sloping, and well drained. It is on ridgetops in the southeastern part of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark grayish brown silt loam about 7 inches thick. The subsoil is about 29 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of well drained Allegheny, Lily, and Upshur soils and moderately well drained Coolville soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of 15 to 25 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help to control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and a moderate acreage is wooded. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope, the depth to bedrock, and frost action are the main limitations of this soil for most urban uses.

Slope and the depth to bedrock are the main limitations of this soil as a site for dwellings with basements. Land shaping and grading help to overcome the slope limitation, but excavation into the bedrock is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

The depth to bedrock is the main limitation of the Gilpin soil as a site for septic tank absorption fields. A large absorption field or an alternate system helps to overcome this limitation.

Slope and a moderate frost-action potential are the main limitations of the Gilpin soil as a site for local roads and streets. Using coarse-grained subgrade or base material to the depth of frost penetration and putting the roads and streets on the contour will help to overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IIIe.

GlD—Gilpin silt loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and well drained. It is on ridgetops and benches in the southeastern part of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of well drained Allegheny, Lily, and Upshur soils and moderately well drained Coolville soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of less than 15 percent or more than 25 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. Most open areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help to control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderate or moderately high potential productivity for trees, and about half of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope and the depth to bedrock are the main limitations of this soil for most urban uses.

Slope is the main limitation of this soil as a site for dwellings. Land shaping and grading can help to overcome the slope, but excavation into the bedrock is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and the depth to bedrock are the main limitations of the Gilpin soil as a site for septic tank absorption fields. A large absorption field, filter field lines on the contour, or an alternate system helps to overcome these limitations.

Slope is the main limitation of the Gilpin soil as a site for local roads and streets. Building roads and streets on the contour will help to overcome this limitation.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IVe.

GlE—Gilpin silt loam, 25 to 35 percent slopes. This soil is moderately deep, steep, and well drained. It is on ridgetops, side slopes, and benches in the southeast part of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of well drained Lily and Upshur soils and moderately well drained Dormont soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils that have lost most or all of their original surface layer, soils with slopes of less than 25 percent or more than 35 percent, soils where stones cover 1 to 3 percent of the surface, and a few areas of bedrock escarpments. Included soils and escarpments make up about 30 percent of this map unit.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the suboil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay but is suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderate or moderately high potential productivity for trees, and about three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope and the depth to bedrock make this soil generally unsuitable for most urban uses.

Slope, bedrock escarpments, stones on the surface, seasonal high water table, depth to bedrock, slow permeability, high shrink-swell potential, low soil strength, and slip hazard severely limit the included soils for most urban uses.

The capability subclass is VIe.

GpF—Gilpin silt loam, 35 to 65 percent slopes, stony. This soil is moderately deep, very steep, and well drained. It is on side slopes throughout the county. Stones that are commonly 1 to 2 feet in diameter cover up to 3 percent of the surface of this soil. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is about 24 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 21 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Lily, Vandalia, and Upshur soils and moderately well drained Dormont soils. The Upshur soils are common in areas in the northern part of the county. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils that have lost most or all of their original surface layer, soils with slopes of less than 35 percent or more than 65 percent, and a few areas of bedrock escarpments. Included soils and escarpments make up about 35 percent of this map unit.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops, hay, or pasture but has moderate or moderately high potential productivity for trees. Most of the acreage is wooded. The hazard of erosion is very severe in unprotected areas and is a major management concern. Slope limits the use of equipment. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope, the depth to bedrock, and the stones on the surface make this soil generally unsuitable for most urban uses.

Slope, bedrock escarpments, seasonal high water table, depth to bedrock, slow permeability, high shrink-swell potential, low soil strength, and slip hazard severely limit the included soils for most urban uses.

The capability subclass is VIIs.

GuC—Gilpin-Upshur complex, 8 to 15 percent slopes. This unit consists of strongly sloping, well drained soils on ridgetops and benches throughout the county. One-fourth to three-fourths of the original surface layer of both soils has been removed by erosion. The unit is about 55 percent moderately deep Gilpin soil, 25 percent deep Upshur soil, and 20 percent other soils. The Gilpin and Upshur soils are in long, very narrow, alternating areas, and it was not practical to map them separately.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 7 inches thick. The subsoil is about 29 inches thick. The upper 4 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Typically, the surface layer of the Upshur soil is dark brown silty clay loam about 6 inches thick. The subsoil is about 33 inches thick. The upper 17 inches of the subsoil is reddish brown silty clay and clay. The next 7 inches is weak red clay. The lower 9 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 44 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils and moderately well drained Coolville soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of 15 to 25 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and the soil has a slip hazard.

These soils are suited to cultivated crops and to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If these soils are cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil help to control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing until the Upshur soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The main limitations for most urban uses are the slope, depth to bedrock, and moderate frost action of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil.

The slope and depth to bedrock are the main limitations of the Gilpin soil as a site for dwellings with basements. Land shaping and grading can help overcome the slope limitation, but excavation into the bedrock for dwellings with basements is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

The depth to bedrock is the main limitation of the Gilpin soil as a site for septic tank absorption fields. A large absorption field or an alternate system helps to overcome this limitation.

The slope and moderate frost-action potential are the main limitations of the Gilpin soil as a site for local roads and streets. Using coarse-grained subgrade or base material to the depth of frost penetration and putting the roads and streets on the contour will help to overcome these limitations.

The high shrink-swell potential and slip hazard are the main limitations of the Upshur soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations will help to overcome the shrink-swell limitation. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

The slow permeability is the main limitation of the Upshur soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps overcome this limitation.

The high shrink-swell potential and low strength are the main limitations of the Upshur soil as a site for local roads and streets. Using coarse-grained subgrade or base material and installing surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IIIe.

GuC3—Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded. This unit consists of strongly sloping, well drained soils on ridgetops and benches throughout the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The unit is about 55 percent moderately deep Gilpin soil, 25 percent deep Upshur soil, and 20 percent other soils. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately.

Typically, the surface layer of the Gilpin soil is brown silt loam about 5 inches thick. The subsoil is about 26 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 23 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 35 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay about 5 inches thick. The subsoil is about 30 inches thick. The upper 15 inches of the subsoil is reddish brown silty clay and clay. The next 6 inches is weak red clay. The lower 9 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 41 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils and moderately well drained Coolville soils. Also included are soils similar to the Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to the Upshur soil but that are less than 40 inches deep to bedrock, soils that have most of their original surface layer, and soils with slopes of 15 to 25 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils have limited suitability for cultivated crops and are better suited to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. The loss of topsoil and plant nutrients, poor tilth, and surface crusting cause poor seed germination. If these soils are cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil help to control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing until the Upshur soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high potential on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The loss of topsoil and plant nutrients and the exposure of the subsoil in places limit the germination of seedlings and inhibit growth. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The main limitations for most urban uses are the slope, depth to bedrock, and moderate frost action of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil.

The slope and depth to bedrock are the main limitations of the Gilpin soil as a site for dwellings with basements. Land shaping and grading can help overcome the slope limitation, but excavation into the bedrock for dwellings with basements is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

The depth to bedrock is the main limitation of the Gilpin soil as a site for septic tank absorption fields. A large absorption field or an alternate system helps to overcome this limitation.

The slope and moderate frost-action potential are the main limitations of the Gilpin soil as a site for local roads and streets. Using coarse-grained subgrade or base material to the depth of frost penetration and putting the roads and streets on the contour will help to overcome these limitations.

The high shrink-swell potential and slip hazard are the main limitations of the Upshur soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations will help to overcome the shrink-swell limitation. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

The slow permeability is the main limitation of the Upshur soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps overcome this limitation.

The high shrink-swell potential and low strength are the main limitations of the Upshur soil as a site for local roads and streets. Using coarse-grained subgrade or base material and installing surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IVe.

GuD—Gilpin-Upshur complex, 15 to 25 percent slopes. This unit consists of moderately steep, well drained soils on ridgetops and benches throughout the county (fig. 5). One-fourth to three-fourths of the original surface layer of both soils has been removed by erosion. The unit is about 55 percent moderately deep Gilpin soil, 25 percent deep Upshur soil, and 20 percent other soils. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Typically, the surface layer of the Upshur soil is dark brown silty clay loam about 5 inches thick. The subsoil is about 33 inches thick. The upper 17 inches of the subsoil is reddish brown silty clay and clay. The next 7 inches is weak red clay. The lower 9 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 43 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils and moderately well

Figure 5.—An area of Gilpin-Upshur complex 15 to 25 percent slopes.

drained Coolville soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of less than 15 percent or more than 25 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils have limited suitability for cultivated crops and are better suited to hay and pasture. Most areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The main limitations for most urban uses are the slope, depth to bedrock, and moderate frost action of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil.

The slope and depth to bedrock are the main limitations of the Gilpin soil as a site for dwellings with basements. Land shaping and grading can help overcome the slope limitation, but excavation into the bedrock for dwellings with basements is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and the depth to bedrock are the main limitations of the Gilpin soil for septic tank absorption fields. A large absorption field, filter field lines on the contour, or an alternate system helps to overcome these limitations.

Slope is the main limitation of the Gilpin soil for local roads and streets. Building roads and streets on the contour will help to overcome this limitation.

The high shrink-swell potential, slope, and slip hazard are the main limitations of the Upshur soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations will help to overcome the shrink-swell limitation. Land shaping and grading will help to overcome the slope limitation. Keeping surface and subsurface water away from the building site and avoiding unnecessary soil disturbance will help to overcome the slip hazard. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

Slow permeability and slope are the main limitations of the Upshur soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps to overcome this limitation.

The slope, high shrink-swell potential, and low strength are the main limitations of the Upshur soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome the slope limitation. Using coarse-grained base material and installing surface drainage ditches and cross culverts for surface water removal will help overcome the low strength limitation.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IVe.

GuD3—Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded. This unit consists of moderately steep, well drained soils on ridgetops and benches throughout the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The unit is about 55 percent moderately deep Gilpin soil, 25 percent deep Upshur soil, and 20 percent other soils. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately.

Typically, the surface layer of the Gilpin soil is brown silt loam about 5 inches thick. The subsoil is about 24 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 21 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 34 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay about 5 inches thick. The subsoil is about 29 inches thick. The upper 14 inches of the subsoil is reddish brown silty clay and clay. The next 6 inches is weak red clay. The lower 9 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 41 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils and moderately well drained Coolville soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have most of their original surface layer, and soils with slopes of less than 15 percent or more than 25 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils are not suited to cultivated crops or hay but are suited to pasture, and most areas are used for pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. It causes a loss of plant nutrients and low pasture yields. Overgrazing of pasture is a major management concern. Proper stocking rates, rotation grazing, and deferred grazing until the Upshur soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The loss of topsoil and plant nutrients and the exposure of the subsoil in places limit the germination of seedlings and inhibit growth. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The main limitations for most urban uses are the slope, depth to bedrock, and moderate frost action of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil.

The slope and depth to bedrock are the main limitations of the Gilpin soil as a site for dwellings with basements. Land shaping and grading can help overcome the slope limitation, but excavation into the bedrock for dwellings with basements is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and depth to bedrock are the main limitations of the Gilpin soil as a site for septic tank absorption fields. A large absorption field, filter field lines on the contour, or an alternate system helps to overcome those limitations.

Slope is the main limitation of the Gilpin soil as a site for local roads and streets. Building roads and streets on the contour will help overcome this limitation.

The high shrink-swell potential, slope, and slip hazard are the main limitations of the Upshur soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations will help to overcome the shrink-swell limitation. Land shaping and grading will help to overcome the slope limitation. Keeping surface and subsurface water away from the building site and avoiding unnecessary soil disturbance will help to overcome the slip hazard. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

Slow permeability and slope are the main limitations of the Upshur soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps to overcome this limitation.

The slope, high shrink-swell potential, and low strength are the main limitations of the Upshur soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome the slope limitation. Using coarse-grained base material and installing surface drainage ditches and cross culverts for surface water removal will help overcome the low strength limitation.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is VIe.

GuE—Gilpin-Upshur complex, 25 to 35 percent slopes. This unit consists of steep, well drained soils on side slopes in the northern and central parts of the county and on ridgetops and benches in other parts of the county. One-fourth to three-fourths of the original surface layer of both soils has been removed by erosion. This unit is about 50 percent moderately deep Gilpin soil, 20 percent deep Upshur soil, and 30 percent other soils. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Typically, the surface layer of the Upshur soil is dark brown silty clay loam about 4 inches thick. The subsoil is about 30 inches thick. The upper 15 inches of the subsoil is reddish brown silty clay and clay. The next 6 inches is weak red clay. The lower 8 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 42 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of less than 25 percent or more than 35 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils are not suited to cultivated crops or hay but are suited to pasture. Most cleared areas are used for pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. Overgrazing of pasture is a major management concern. Proper stocking rates, rotation grazing, and deferred grazing until the Upshur soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low soil strength, and slip hazard of the Upshur soil are the main limitations of these soils for most urban uses.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is VIe.

GuE3—Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded. This unit consists of steep, well drained soils on side slopes in the northern and central parts of the county and on ridgetops and benches throughout the county. Erosion has removed most of the original surface layer, and the subsoil is exposed in places. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately. The unit is about 50 percent moderately deep Gilpin soil, 20 percent deep Upshur soil, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is brown silt loam about 4 inches thick. The subsoil is about 23 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 20 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 31 inches.

Typically, the surface layer of the Upshur soil is reddish brown silty clay about 4 inches thick. The subsoil is about 27 inches thick. The upper 14 inches of the subsoil is reddish brown silty clay and clay. The next 5 inches is weak red clay. The lower 8 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 40 inches.

Included with these soils in mapping are a few small areas of well drained Lily soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most of their original surface layer, and soils with slopes of less than 25 percent or more than 35 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. Most cleared areas are used for pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. A plant cover is needed in the unprotected areas but is difficult to establish. Overgrazing of pasture is a major management concern. Proper stocking rates, rotation grazing, and deferred grazing until the Upshur soil is reasonably firm are major pasture management needs.

The potential productivity for trees is moderately high on the Gilpin soil and moderate on the Upshur soil. A moderate acreage is wooded. The loss of topsoil and plant nutrients and the exposure of the subsoil in places limit the germination of seedlings and inhibit plant growth. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil are the main limitations of these soils for most urban uses.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low soil strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is VIIe.

GuF—Gilpin-Upshur complex, 35 to 65 percent slopes. This unit consists of very steep, well drained soils on side slopes mostly in the northern and central parts of the county. In many areas the landscape is a series of narrow, contour benches, called bench-and-break topography. One-fourth to three-fourths of the original surface layer of both soils has been removed by erosion. The Gilpin and Upshur soils are in long, narrow, alternating areas, and it was not practical to map them separately. The unit is about 50 percent moderately deep Gilpin soil, 20 percent deep Upshur soil, and 30 percent other soils.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 4 inches thick. The subsoil is about 24 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 21 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 33 inches.

Typically, the surface layer of the Upshur soil is dark brown silty clay loam about 4 inches thick. The subsoil is about 28 inches thick. The upper 15 inches of the subsoil is reddish brown silty clay and clay. The next 6 inches is weak red clay. The lower 7 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 41 inches.

Included with these soils in mapping are a few small areas of well drained Lily and Vandalia soils and moderately well drained Coolville and Dormont soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most or all of their original surface layer, soils where 1 to 3 percent of the surface is covered with stones, areas of bedrock escarpments, and soils with slopes of less than 35 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is very rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is very rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

These soils are not suited to cultivated crops or hay and are difficult to manage for pasture. They have moderate or moderately high potential productivity for trees, and nearly all of the acreage is wooded. Slope restricts the use of equipment on both soils. The use of equipment is restricted on the Upshur soil during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

The slope and depth to bedrock of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low soil strength, and slip hazard of the Upshur soil limit the soils for urban uses.

Slope, seasonal high water table, depth to bedrock, slow permeability, high shrink-swell potential, low strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is VIIe.

GxD—Gilpin-Upshur-Urban land complex, 15 to 25 percent slopes. This unit consists of moderately steep, well drained Gilpin and Upshur soils and areas covered by buildings, streets, parking lots, and other structures. The soils and urban land are on ridgetops, benches, and side slopes mostly in Huntington. The Gilpin and Upshur soils and Urban land are in such an intricate pattern that it was not practical to separate them in mapping. The unit is about 25 percent moderately deep Gilpin soil, 15 percent deep Upshur soil, 35 percent urban land, and 25 percent other soils.

Typically, the surface layer of the Gilpin soil is dark grayish brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 3 inches of the subsoil is yellowish brown silt loam. The lower 25 inches is strong brown channery loam and very channery loam. The substratum is strong brown very channery loam that extends to bedrock at a depth of about 38 inches.

Typically, the surface layer of the Upshur soil is dark brown silty clay loam about 5 inches thick. The subsoil is about 33 inches thick. The upper 17 inches of the subsoil is reddish brown silty clay and clay. The next 7 inches is weak red clay. The lower 9 inches is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 43 inches.

Included with this unit in mapping are small areas of well drained Allegheny soils and moderately well drained Monongahela soils. Also included are soils similar to this Gilpin soil but that are less than 20 inches deep to bedrock, soils similar to this Upshur soil but that are less than 40 inches deep to bedrock, soils that have lost most or all of their original surface layer, and soils with slopes of less than 15 percent or more than 25 percent.

The available water capacity of this Gilpin soil is moderate. Permeability is moderate in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, this Gilpin soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of the Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

This unit is generally unsuited to farming or woodland. Most of the unit is used for urban development. The open areas are used mostly for lawns and a few home gardens.

The main limitations for most urban uses are the slope, depth to bedrock, and moderate frost action of the Gilpin soil and the slope, slow permeability, high shrink-swell potential, low strength, and slip hazard of the Upshur soil.

The slope and depth to bedrock are the main limitations of the Gilpin soil as a site for dwellings with basements. Land shaping and grading can help overcome the slope limitation, but excavation into the bedrock for dwellings with basements is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and depth to bedrock are the main limitations of the Gilpin soil as a site for septic tank absorption fields. A large absorption field, filter field lines on the contour, or an alternate system helps to overcome those limitations.

Slope is the main limitation of the Gilpin soil as a site for local roads and streets. Building roads and streets on the contour will help overcome this limitation.

The high shrink-swell potential, slope, and slip hazard are the main limitations of the Upshur soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations will help to overcome the shrink-swell limitation. Land shaping and grading will help to overcome the slope limitation. Keeping surface and subsurface water away from the building site and avoiding unnecessary soil disturbance will help to overcome the slip hazard. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

Slow permeability and slope are the main limitations of the Upshur soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps to overcome this limitation.

The slope, high shrink-swell potential, and low strength are the main limitations of the Upshur soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome the slope limitation. Using coarse-grained base material and installing surface drainage ditches and cross culverts for surface water removal will help overcome the low strength limitation.

Slope, depth to bedrock, high shrink-swell potential, seasonal high water table, low strength, and slip hazard limit most of the included soils for urban uses. The included Allegheny soils with slopes of less than 15 percent have few limitations for urban uses.

This unit is not assigned to a capability subclass.

Gy—Guyan silt loam. This soil is very deep, nearly level, and somewhat poorly drained. It is in low stream terraces along the Guyan Creek, the Mud River, and the Guyandotte River. This soil is protected from flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is grayish brown silt loam about 6 inches thick. The subsoil is about 42 inches thick. The upper 3 inches of the subsoil is light yellowish brown silt loam mottled with light brownish gray and yellowish brown. The next 5 inches is brownish yellow loam mottled with light gray. The lower 34 inches is brownish yellow, strong brown, and light gray clay loam. The substratum is yellowish brown and light gray silty clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Kanawha soils and moderately well drained Cotaco and Markland soils. Also included are a few small areas of poorly drained soils, mostly in the Ona area, that have more clay in the subsoil than this Guyan soil. A few small areas of soils subject to rare flooding are along the Mud River near Milton, and a few areas have slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Guyan soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate. Reaction is strongly acid to neutral in the surface layer and upper part of the subsoil and strongly acid or very strongly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 6 to 18 inches below the surface that restricts the root zone for some plants.

This soil is suited to cultivated crops, but it is better suited to pasture and hay. Artificial drainage is needed to improve the suitability of this soil for cultivated crops. If this soil is cultivated, using conservation tillage and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue help to maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees tolerant to wetness, but only a small acreage is wooded. The seasonal high water table is the main limitation of this soil for woodland management. The use of equipment is restricted during wet seasons because the soil is soft. Most of the trees are in small, isolated woodlots around the edge of crop fields or between urban areas. The forested areas are generally not large enough for commercial wood production.

The seasonal high water table, low strength, and frost action are the main limitations of this soil for most urban uses.

The seasonal high water table is the main limitation of this soil as a site for dwellings with basements and for septic tank absorption fields. Installing foundation drains, sealing foundations, and backfilling with porous material will help prevent wet basements. A more suitable soil or an alternate system will help overcome the limitations.

The seasonal high water table, frost action, and low strength are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Using raised fill of coarse-grained base material to frost depth and installing a surface and subsurface drainage system and cross culverts for surface water removal will help overcome these limitations.

Seasonal high water table, slow permeability, rare flooding, and low strength limit most of the included soils for urban uses. The included Kanawha soils have few limitations for most urban uses.

The capability subclass is IIIw.

Gz—Guyan-Urban land complex. This unit consists of very deep, nearly level, somewhat poorly drained Guyan soil and areas covered by buildings, streets, parking lots, and other urban structures. The soil and urban land are on low stream terraces along the Mud River and the Guyandotte River, mostly in Barboursville and Milton. Slope ranges from 0 to 3 percent. This unit is protected from flooding. It is about 40 percent Guyan soil, 40 percent urban land, and 20 percent other soils. The Guyan soil and urban land are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Guyan soil is grayish brown silt loam about 6 inches thick. The subsoil is about 42 inches thick. The upper 3 inches of the subsoil is light yellowish brown silt loam mottled with light brownish gray and yellowish brown. The next 5 inches is brownish yellow loam mottled with light gray, and the lower 34 inches is brownish yellow, strong brown, and light gray clay loam. The substratum is yellowish brown and light gray silty clay loam that extends to a depth of 65 inches or more.

Included with this unit in mapping are a few small areas of well drained Kanawha soils and moderately well drained Cotaco and Markland soils. Also included are a few small areas of soils subject to rare flooding along the Mud River near Milton, soils with slopes of 3 to 8 percent, and areas of Udorthents.

The available water capacity of this Guyan soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate. Reaction is strongly acid to neutral in the surface layer and upper part of the subsoil and strongly acid or very strongly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 6 to 18 inches below the surface that restricts the root zone for some plants.

This unit is generally unsuited to farming or woodland. Most areas are used for urban development. The open areas are used mostly for lawns and a few home gardens.

The seasonal high water table, low strength, and frost action are the main limitations of the Guyan soil for most urban uses.

The seasonal high water table is the main limitation of the Guyan soil as a site for dwellings with basements and for septic tank absorption fields. Installing foundation drains, sealing foundations, and backfilling with porous material will help prevent wet basements. A more suitable soil or an alternate system will help overcome the limitations

The seasonal high water table, frost action, and low strength are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Using raised fill of coarse-grained base material to frost depth and installing a surface and subsurface drainage system and cross culverts for surface water removal will help overcome these limitations.

Seasonal high water table, slow permeability, rare flooding, and low soil strength limit most of the included soils for urban uses. The included Kanawha soils have a few limitations for most urban uses.

This unit is not assigned to a capability subclass.

Hu—Huntington silt loam. This soil is very deep, nearly level, and well drained. It is on flood plains along the Ohio River. This soil is subject to occasional flooding.

Typically, the surface layer is very dark grayish brown silt loam about 14 inches thick. The subsoil is dark yellowish brown and dark brown silt loam about 30 inches thick. The substratum is dark brown silt loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Ashton soils, moderately well drained Lindside soils, and poorly drained Melvin soils. Also included are a few small areas of soils with a surface layer and subsoil of loam and soils with slopes of 3 to 8 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of this Huntington soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Working the crop residue into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. Proper stocking rates and rotation grazing are the major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most of the trees are in small isolated woodlots between crop fields and along the Ohio River. These areas generally are not large enough for commercial wood production.

The flooding and frost action are the main limitations of this soil for most urban uses.

The flooding is the main limitation of this soil as a site for dwellings with basements and for septic tank absorption fields. Protecting the areas from flooding or choosing an alternate system or a better suited soil will help overcome this limitation.

The flooding and frost action are the main limitations of this soil as a site for local roads and streets. Using raised fill above the flood level and using coarse-grained base material to frost depth help to prevent damage to pavement.

A seasonal high water table, flooding, low strength, and frost action limit the included soils for most urban uses.

The capability subclass is IIw.

KaA—Kanawha loam, 0 to 3 percent slopes, protected. This soil is very deep, nearly level, and well drained. It is on high flood plains and low stream terraces along the Guyandotte River. This soil is protected from flooding.

Typically the surface layer is dark brown loam about 11 inches thick. The subsoil is about 34 inches thick and is yellowish brown clay loam and loam. The substratum is yellowish brown loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Sensabaugh soils, moderately well drained Cotaco and Markland soils, and somewhat poorly drained Guyan soils. In a few small areas the soils are similar to this Kanawha soil but the surface layer and subsoil are less than 40 inches thick, and in some other small areas the subsoil is loamy sand. Also included are a few escarpments along the perimeter of some map units, a few soils subject to rare flooding, and a few soils with slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Working the crop residue into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. Proper stocking rates and rotation grazing are the major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most of the trees are along the banks of the Guyandotte River and in small woodlots. These areas generally are not large enough for commercial wood production.

Low strength and a moderate frost-action potential are the main limitations of this soil for some urban uses.

This soil has few limitations as a site for dwellings with basements and for septic tank absorption fields.

The low strength and frost action are the main limitations of this soil as a site for local roads and streets. Providing coarse-grained base material to frost depth helps to prevent damage to pavement.

A seasonal high water table, rare flooding, low strength, frost action, and slope limit the included soils for most urban uses.

The capability class is I.

KaB—Kanawha loam, 3 to 8 percent slopes, protected. This soil is very deep, gently sloping, and well drained. It is on high flood plains and low stream terraces along the Guyandotte River. This soil is protected from flooding.

Typically the surface layer is dark brown loam about 10 inches thick. The subsoil is about 34 inches thick and is yellowish brown clay loam and loam. The substratum is yellowish brown loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Sensabaugh soils, moderately well drained Cotaco and Markland soils, and somewhat poorly drained Guyan soils. In a few small areas the soils are similar to this Kanawha soil but the surface layer and subsoil are less than 40 inches thick, and in some other small areas the subsoil is loamy sand. Also included are escarpments along the perimeter of some map units, a few soils subject to rare flooding, and a few soils with slopes of 0 to 3 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops or hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most of the trees are along the banks of the Guyandotte River and in small woodlots. These areas generally are not large enough for commercial wood production.

Low strength and a moderate frost-action potential are the main limitations of this soil for some urban uses.

This soil has few limitations as a site for dwellings with basements and for septic tank absorption fields.

The low strength and frost action are the main limitations of this soil as a site for local roads and streets. Providing coarse-grained base material to frost depth helps to prevent damage to pavement.

A seasonal high water table, rare flooding, low strength, frost action, and slope limit the included soils for most urban uses.

The capability subclass is IIe.

KnA—Kanawha loam, 0 to 3 percent slopes, rarely flooded. This soil is very deep, nearly level, and well drained. It is on high flood plains along the Guyan Creek and the Mud River. This soil is subject to rare flooding.

Typically the surface layer is dark brown loam about 11 inches thick. The subsoil is about 34 inches thick and is yellowish brown clay loam and loam. The substratum is yellowish brown loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin, Pope, and Sensabaugh soils, moderately well drained Cotaco and Lobdell soils, and somewhat poorly drained Guyan soils. In a few small areas the soils are similar to this Kanawha soil but the surface layer and subsoil are less than 40 inches thick or the subsoil is loamy sand very strongly acid silt loam. Also included are soils that are not flooded and soils with slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid or moderately acid in the surface layer and upper part of the subsoil and moderately acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Working the crop residue into the soil helps to maintain fertility and tilth. In places, crops are subject to damage from flooding. Proper stocking rates and rotation grazing are the major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most of the trees are in small, isolated woodlots between crop fields and along the Mud River. These areas generally are not large enough for commercial wood production.

The flooding, low strength, and a moderate frost-action potential are the main limitations of this soil for most urban uses.

The flooding is the main limitation of this soil as a site for dwellings with basements and for septic tank absorption fields. Protecting the soil from flooding or choosing a more suitable soil will help overcome the limitation.

The flooding, low strength, and frost action are the main limitations of this soil as a site for local roads and streets. Raised fill above the flood level and coarse-grained base material to frost depth help to prevent damage to pavement.

A seasonal high water table, occasional flooding, low strength, frost action, and slope limit the included soils for most urban uses.

The capability class is I.

KnB—Kanawha loam, 3 to 8 percent slopes, rarely flooded. This soil is very deep, gently sloping, and well drained. It is on high flood plains along the Guyan Creek and the Mud River. This soil is subject to rare flooding.

Typically, the surface layer is dark brown loam about 10 inches thick. The subsoil is about 34 inches thick and is yellowish brown clay loam and loam. The substratum is yellowish brown loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin, Pope, and Sensabaugh soils, moderately well drained Cotaco and Lobdell soils, and somewhat poorly drained Guyan soils. In a few small areas the soils are similar to this Kanawha soil but the surface layer and subsoil are less than 40 inches thick or the subsoil is loamy sand or very strongly acid silt loam. Also included are soils that are not flooded and soils with slopes of 0 to 3 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops or hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most of the trees are in small, isolated woodlots between crop fields and along the Mud River. These areas generally are not large enough for commercial wood production.

The flooding, low strength, and a moderate frost-action potential are the main limitations of this soil for most urban uses.

The flooding is the main limitation of this soil as a site for dwellings with basements and for septic tank absorption fields. Protecting the soil from flooding or choosing a more suitable soil will help overcome the limitation.

The flooding, low strength, and frost action are the main limitations of this soil as a site for local roads and streets. Raised fill above the flood level and coarse-grained base material to frost depth help to prevent damage to pavement.

A seasonal high water table, occasional flooding, low strength, frost action, and slope limit the included soils for most urban uses.

The capability subclass is IIe.

KuB—Kanawha-Urban land complex, 0 to 8 percent slopes. This unit consists of very deep, nearly level to gently sloping, well drained Kanawha soil and areas covered by buildings, streets, parking lots, and other urban structures. The unit is on low stream terraces and high flood plains mostly in Barboursville along the Guyandotte River. It is protected from flooding. It is about 40 percent Kanawha soil, 40 percent urban land, and 20 percent other soils. The Kanawha soil and urban land are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Kanawha soil is dark brown loam about 10 inches thick. The subsoil is about 34 inches thick and is yellowish brown clay loam and loam. The substratum is yellowish brown loam that extends to a depth of 60 inches or more.

Included with this complex in mapping are a few small areas of well drained Chagrin and Sensabaugh soils, moderately well drained Cotaco and Markland soils, and somewhat poorly drained Guyan soils. In a few small areas the soils are similar to this Kanawha soil but the surface layer and subsoil are less than 40 inches thick or the subsoil is loamy sand. Also included are escarpments along the perimeter of some map units and a few soils subject to rare flooding.

The available water capacity of this Kanawha soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches.

This unit is generally unsuited to farming or woodland. Most of this unit is used for urban development. The open areas are used mostly for lawns and a few home gardens.

Low strength and a frost-action potential are the main limitations of this soil for some urban uses, mainly as a site for local roads and streets. Providing coarse-grained base material to frost depth helps to prevent damage to pavement.

This soil has few limitations as a site for dwellings with basements and for septic tank absorption fields.

A seasonal high water table, rare flooding, low strength, frost action, and slope limit the included soils for most urban uses.

This unit is not assigned to a capability subclass.

LaC—Lakin loamy sand, 3 to 15 percent slopes. This soil is very deep, gently sloping to strongly sloping, and excessively drained. It is on high stream terraces along the Ohio River.

Typically, the surface layer is brown loamy fine sand about 5 inches thick underlain by 5 inches of yellowish brown loamy sand. The subsoil is 40 inches thick. It is yellowish brown loamy fine sand with strong brown spots. The substratum is yellowish brown loamy fine sand that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Vandalia and Wheeling soils moderately well drained Cotaco soils. Also included are soils with slopes of 15 to 25 percent and a few small areas of Udorthents. Included soils make up about 15 percent of this map unit.

The available water capacity of this Lakin soil is very low to moderate. Permeability is rapid in the subsoil. Runoff is rapid, and natural fertility is low or moderate. Where unlimed, the soil is medium acid to very strongly acid. The depth to bedrock is more than 60 inches. This soil is droughty during the growing season if rainfall is low.

This soil has limited suitability for cultivated crops. It is better suited to hay and pasture. The hazard of erosion is severe in unprotected areas and is a management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil will help to control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderate potential productivity for trees, but most of the acreage is cleared. The use of equipment is limited, and seedling mortality is high. Seeds and seedlings grow well if competing vegetation is controlled and adequate moisture is available.

Slope and poor filtering capacity are the main limitations of this soil for most urban uses.

Land shaping and grading can overcome the slope limitation for dwellings with basements. Erosion is a hazard in areas cleared for construction, but designing dwellings so that they conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Poor filtering causes a hazard of contamination of the ground water in areas of this soil used for septic tank absorption fields. Choosing a more suitable soil will help overcome the limitation.

Slope is the main limitation of this soil as a site for local roads and streets. Building roads and streets on the contour helps to overcome this limitation.

Slope, slow permeability, a seasonal high water table, high shrink-swell, and low strength limit some of the included soils for urban uses. The included Wheeling soils have few limitations for most urban uses.

The capability subclass is IVs.

LlD—Lily sandy loam, 15 to 25 percent slopes. This soil is moderately deep, moderately steep, and well drained. It is on ridgetops and knobs mostly in the northern and central parts of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is brown and light yellowish brown and sandy loam about 10 inches thick. The subsoil is about 20 inches thick. The upper 4 inches of the subsoil is strong brown loam. The next 10 inches is yellowish red clay loam. The lower 6 inches is strong brown loam. The substratum is yellowish brown and strong brown sandy loam that extends to bedrock at a depth of about 38 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Upshur soils and moderately well drained Coolville soils. Also included are soils that have lost most or all of their original surface layer and soils with slopes of less than 15 percent or more than 25 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of this Lily soil is moderate. Permeability is moderately rapid in the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. Most open areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil help to control erosion and maintain fertility and tilh. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and about one-third or the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope and depth to bedrock are the main limitations of this soil for most urban uses.

Slope is the main limitation of this soil as a site for dwellings. Land shaping and grading can help to overcome the slope limitation, but excavation into the bedrock is difficult. Erosion is a hazard in areas cleared for construction, but designing dwellings to conform to the natural slope and setting will help keep land shaping, and thus erosion, to a minimum. Establishing a plant cover during or soon after construction will also help reduce erosion.

Slope and the depth to bedrock are the main limitations of the Lily soil as a site for septic tank absorption fields. A large absorption field, filter field lines on the contour, or an alternate system help to overcome these limitations.

Slope is the main limitation of this Lily soil as a site for local roads and streets. Building roads and streets on the contour will help to overcome this limitation.

Slope, depth to bedrock, high shrink-swell potential, high frost action, a seasonal high water table, low strength, and a slip hazard limit the included soils for most urban uses.

The capability subclass is IVe.

LlE—Lily sandy loam, 25 to 35 percent slopes. This soil is moderately deep, steep, and well drained. It is on ridgetops and knobs mostly in the northern and central parts of the county. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is brown and light yellowish brown sandy loam about 7 inches thick. The subsoil is about 18 inches thick. The upper 4 inches of the subsoil is strong brown loam. The next 9 inches is yellowish red clay loam. The lower 5 inches is strong brown loam. The substratum is yellowish brown and strong brown sandy loam that extends to bedrock at a depth of about 33 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin and Upshur soils. Also included are soils that have lost most or all of their original surface layer, a few bedrock escarpments, and soils where stones cover 1 to 3 percent of the surface. A few soils have slopes of less than 25 percent or more than 35 percent. Included soils and bedrock escarpments make up about 25 percent of this map unit.

The available water capacity of this Lily soil is moderate. Permeability is moderately rapid in the subsoil. Runoff is very rapid, and natural fertility is low. Where unlimed, this soil is strongly acid to extremely acid. The root zone for some plants is restricted by bedrock at a depth of 20 to 40 inches.

This soil is not suited to cultivated crops or hay but is suited to pasture. The hazard of erosion is very severe in unprotected areas and is a major management concern. Overgrazing of pasture is also a major management concern. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and about three-fourths of the acreage is wooded. Erosion on logging roads and skid trails is a major management concern, and placing roads and trails close to the contour helps to control this erosion.

Slope and the depth to bedrock make this soil generally unsuitable for most urban uses.

Slope, bedrock escarpments, stones, depth to bedrock, slow permeability, high shrink-swell potential, low strength, and a slip hazard limit the included soils for most urban uses.

The capability subclass is VIe.

Lm—Lindside silt loam. This soil is very deep, nearly level, and moderately well drained. It is on flood plains along the Ohio River. This soil is subject to occasional flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 11 inches thick. The subsoil is about 24 inches thick. The upper 5 inches of the subsoil is brown silt loam, and the lower 19 inches is brown silty clay loam mottled with pinkish gray and light brownish gray. The substratum is brown silt loam and silty clay loam mottled with light brownish gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Ashton and Huntington soils and poorly drained Melvin soils. Also included are a few small areas of soil with a surface layer and subsoil of loam, a few areas of soil with a subsoil of silty clay, and a few soils with slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Lindside soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid or medium acid in the surface layer and upper part of the subsoil and medium acid or slightly acid in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table at a depth of about 1.5 to 3 feet that restricts the root zone for some plants.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for farming. Artificial drainage will help improve the suitability of this soil for most crops. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop. Delaying tillage until the soil is reasonably dry and using crop residue are practices that help to maintain fertility and tilth. In places, crops are subject to damage from flooding. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential for trees, but only a small acreage is wooded. Most of the trees are in small, isolated woodlots near the edge of crop fields or between urban areas. These areas generally are not large enough for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

The hazard of flooding, the seasonal high water table, and a high frost-action potential are the main limitations of this soil for most urban uses.

The flooding and the seasonal high water table are the main limitations of this soil as a site for dwellings with basements, for septic tank absorption fields, and for local roads and streets. Choosing a more suitable soil will help overcome those limitations. This soil is soft when wet, causing the pavement to crack under heavy traffic. Raised fill of coarse-grained base material to frost depth and a subsurface drainage system and cross culverts for surface water removal will help prevent damage to pavement.

A seasonal high water table, slow permeability, low strength, occasional and rare flooding, and high frost action limit most of the included soils for urban uses.

The included Ashton soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIw.

Lo—Lobdell silt loam. This soil is very deep, nearly level, and moderately well drained. It is on flood plains along small streams throughout the county. This soil is subject to occasional flooding generally during winter and spring, before crops are planted. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silt loam about 5 inches thick. The subsoil is about 30 inches thick. The upper 11 inches of the subsoil is dark yellowish brown silt loam. The lower 19 inches is yellowish brown and dark yellowish brown loam mottled with light brownish gray. The substratum is brown stratified loam, silt loam, and sandy loam mottled with light brownish gray and yellowish brown, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin, Pope, Sensabaugh, and Vandalia soils and moderately well drained Dormont soils. Also included are a few small areas where the seasonal high water table is near the surface, a few small areas of soil with a subsoil of silty clay loam, small areas of soil that are rarely flooded, and a few soils with slopes of 3 to 8 percent. Included soils make up about 25 percent of this map unit.

The available water capacity of this Lobdell soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is strongly acid to neutral in the surface layer and subsoil and medium acid to neutral in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table at a depth of about 1.5 to 3 feet that restricts the root zone for some plants.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for farming. Artificial drainage will improve the suitability of this soil for most crops. Cultivated crops can be grown continuously, but the soil needs a cover crop for protection from spring flooding and runoff. Delaying tillage until the soil is reasonably dry and using crop residue are practices that help to maintain fertility and tilth. In places, crops are damaged from flooding. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Most of the trees are in isolated woodlots that are generally too small for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

The hazard of flooding, the seasonal high water table, and a high frost-action potential are the main limitations of this soil for most urban uses.

The flooding and the seasonal high water table are the main limitations of this soil as a site for dwellings with basements and for septic tank absorption fields. Choosing a more suitable soil will help overcome the limitations.

The frost action and the flooding are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. A raised fill of coarse-grained base material to frost depth and a surface and subsurface drainage system and cross culverts for surface water removal will help to overcome these limitations.

A seasonal high water table, low strength, occasional and rare flooding, and high frost action limit most of the included soils for urban uses. The included Sensabaugh soils that are not flooded have fewer limitations for most urban uses than the other included soils.

The capability subclass is IIw.

MaB—Markland silt loam, 3 to 8 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on low stream terraces along the Guyan Creek, the Mud River, and the Guyandotte River.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 10 inches of the subsoil is yellowish brown silty clay loam, and the lower 18 inches is yellowish brown silty clay mottled with light brownish gray and gray. The substratum is yellowish brown silty clay mottled with gray and light brownish gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Kanawha soils, moderately well drained Cotaco soils, and somewhat poorly drained Guyan soils. Also included are a few small areas of soil that is rarely flooded, a few soils with slopes of less than 3 percent or more than 8 percent, and a few small areas of Udorthents. Included soils make up about 20 percent of this map unit.

The available water capacity of this Markland soil is moderate or high. Permeability is slow in the subsoil. Runoff is medium, and natural fertility is moderate or high. Where unlimed, the soil is neutral to strongly acid in the surface layer, slightly acid to strongly acid in the upper part of the subsoil, and mildly alkaline or moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table at a depth of about 1.5 to 3 feet that restricts the root zone of some plants.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is farmed. The hazard of erosion is moderate in unprotected areas and is a management concern. Some small wet areas need drainage to be suitable for most crops. Surface drainage is generally more effective than tile drainage, but the soil is difficult to drain. If this soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help to control erosion and to maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Most of the trees are in small, isolated woodlots near the edge of crop fields or between urban areas. These areas generally are not large enough for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

A high shrink-swell potential, low strength, the seasonal high water table, and the slow permeability are the main limitations of this soil for most urban uses.

The shrink-swell potential is the main limitation of this soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations with surface and subsurface drains will help to overcome the shrink-swell limitation.

The seasonal high water table and the slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field area, a drainage system around the filter field, an alternate system, or a more suitable soil will help to overcome those limitations.

The shrink-swell potential and low strength are the main limitations of this soil as a site for local roads and streets. A coarse-grained base material and surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

A seasonal high water table, high shrink-swell potential, high frost action, low strength, slow permeability, occasional flooding, and rare flooding limit most of the included soils for urban uses. The included Kanawha soils have few limitations for most urban uses.

The capability subclass is IIe.

MaC—Markland silt loam, 8 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is on low stream terraces along the Guyan Creek, the Mud River, and the Guyandotte River.

Typically, the surface layer is brown silt loam about 6 inches thick. The subsoil is about 28 inches thick. The upper 10 inches of the subsoil is yellowish brown silty clay loam, and the lower 18 inches is yellowish brown silty clay mottled with light brownish gray and gray. The substratum is yellowish brown silty clay mottled with gray and light brownish gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Kanawha soils, moderately well drained Cotaco soils, and somewhat poorly drained Guyan soils. Also included are a few small areas of soils that are subject to rare or occasional flooding, a few soils with slopes of less than 8 percent or more than 15 percent, and a few small areas of Udorthents. Included soils make up about 25 percent of this map unit.

The available water capacity of this Markland soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil is neutral to strongly acid in the surface layer, slightly acid to strongly acid in the upper part of the subsoil, and mildly alkaline or moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table at a depth of about 1.5 to 3 feet that restricts the root zone for some plants.

This soil is suited to cultivated crops and to hay and pasture. Most of the acreage is idle or farmed. The hazard of erosion is severe in unprotected areas and is a management concern. Some small wet areas need drainage to be suitable for crops. Surface drainage is generally more effective than tile drainage, but the soil is difficult to drain. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help to control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. Most of the trees are in small, isolated woodlots between urban areas. These areas generally are not large enough for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

A high shrink-swell potential, low strength, the seasonal high water table, and the slow permeability are the main limitations of this soil for most urban uses.

The shrink-swell potential is the main limitation of this soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with porous material, and keeping water away from footings and foundations with surface and subsurface drains will help to overcome the shrink-swell limitation.

The seasonal high water table and the slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field area, a drainage system around the filter field, a more suitable soil, or an alternate system will help to overcome those limitations.

The shrink-swell potential and low strength are the main limitations of this soil as a site for local roads and streets. A coarse-grained base material and surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

A seasonal high water table, high shrink-swell potential, high frost action, low strength, slow permeability, occasional flooding, and rare flooding limit most of the included soils for urban uses. The included Kanawha soils have few limitations for most urban uses.

The capability subclass is IIIe.

Me—Melvin silt loam. This soil is very deep, nearly level, and poorly drained. It is on flood plains along the Ohio River. This soil is subject to occasional flooding. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam mottled with strong brown and dark grayish brown, and it is about 9 inches thick. The subsoil is about 18 inches thick. It is dark grayish brown silt loam mottled with strong brown. The substratum is gray and grayish brown silty clay loam mottled with strong brown, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Ashton and Huntington soils and a few small areas of moderately well drained Lindside soils. Also included are a few small areas of soil with a surface layer of silty clay loam and a subsoil of silty clay and a few soils with slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Melvin soil is high. Permeability is moderate in the subsoil. Runoff is slow, and natural fertility is moderate or high. Where unlimed, the soil ranges from medium acid to neutral in the surface layer and upper part of the subsoil and is slightly acid or neutral in the lower part of the subsoil and in the substratum. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table at or near the surface that restricts the root zone for many plants.

This soil is suited to cultivated crops, but it is better suited to water-tolerant hay or pasture plants. Most of the acreage is farmed, or it is in swamps. Artificial drainage is needed to improve the suitability of this soil for cultivated crops, hay, and pasture, and providing drainage is a major farming management concern. If this soil is cultivated, using conservation tillage and a crop sequence that includes hay, delaying tillage until the soil is reasonably dry, and using crop residue in and on the soil are practices that help to maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees tolerant of wet sites, but only a small acreage is wooded. The seasonal high water table is the main limitation. Most of the trees are in small, isolated woodlots at the edge of crop fields or between urban areas. These areas generally are not large enough for commercial wood production. The use of equipment is restricted during wet seasons because the soil is soft.

The hazard of flooding, the seasonal high water table, and low soil strength are the main limitations of this soil for most urban uses.

The flooding and the seasonal high water table are the main limitations of this soil as a site for dwellings with basements and for septic tank filter fields. Choosing a more suitable soil will help overcome the limitations.

Low strength, the flooding, and the seasonal high water table are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Raised fill above the flood level, coarse-grained base material to frost depth, and a surface and subsurface drainage system and cross culverts for surface water removal will help overcome these limitations.

A seasonal high water table, slow permeability, low soil strength, occasional and rare flooding, and high frost action limit most of the included soils for urban uses. The included Ashton soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIIw.

MoB—Monongahela loam, 3 to 8 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on high stream terraces mostly in the Teays Valley.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil is about 50 inches thick. The upper 17 inches of the subsoil is brownish yellow loam that is mottled with light gray in the lower part. The lower 33 inches is a firm and very firm, brittle layer of brownish yellow and light yellowish brown loam mottled with light gray. The substratum is brownish yellow loam mottled with light gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Allegheny, Gilpin, and Upshur soils and somewhat poorly drained Guyan soils. Also included are a few small areas of soils that have a subsoil of reddish brown silty clay, a few areas of soils with a surface layer of silt loam, and soils with slopes of less than 3 percent or more than 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderately slow or slow in the very firm part of the subsoil. Runoff is medium, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 1.5 to 3 feet below the surface that restricts the root zone for some plants.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. Some small wet areas need artificial drainage to be suitable for desirable crops. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated or tilled, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil will help control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft.

The seasonal high water table, the moderately slow or slow permeability, and low soil strength are the main limitations of this soil for most urban uses.

The seasonal high water table is the main limitation of this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with a porous material will help prevent wet basements.

The seasonal high water table and the moderately slow or slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field, a drainage system around the filter field to lower the seasonal high water table, a more suitable soil, or an alternate system will help overcome these limitations.

The seasonal high water table, frost action, and low soil strength are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Raised fill of coarse-grained base material to frost depth and a surface and subsurface drainage system and cross culverts for surface water removal will help overcome these limitations.

Slope, a seasonal high water table, slow permeability, high shrink-swell potential, depth to bedrock, and low strength limit most of the included soils for most uses. The included Allegheny soils with slopes of less than 8 percent have fewer limitations for most urban uses than the other included soils.

The capability subclass is IIe.

MoC—Monongahela loam, 8 to 15 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It commonly has seeps and "wet-weather springs." This soil is on high stream terraces mostly in the Teays Valley. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is brown loam about 5 inches thick. The subsoil is about 49 inches thick. The upper 16 inches of the subsoil is brownish yellow loam mottled with light gray in the lower part. The lower 33 inches is a firm and very firm, brittle layer of brownish yellow and light yellowish brown loam mottled with light gray. The substratum is brownish yellow loam mottled with light gray, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Allegheny, Gilpin, and Upshur soils and somewhat poorly drained Guyan soils. Also included are a few small areas of soils that have a subsoil of reddish brown silty clay, a few areas of soils with a surface layer of silt loam, and soils with slopes of less than 8 percent or more than 15 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Monongahela soil is moderate. Permeability is moderately slow or slow in the very firm part of the subsoil. Runoff is rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 1.5 to 3 feet below the surface that restricts the root zone for some plants.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. The hazard of erosion is severe in unprotected areas and is a management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil will help to control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The seasonal high water table, the moderately slow or slow permeability, slope, and low strength are the main limitations of this soil for most urban uses.

The seasonal high water table and the slope are the main limitations of this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with a porous material will help prevent wet basements. Land shaping and grading will help to overcome the slope limitation.

The seasonal high water table and the moderately slow or slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field area, a drainage system around the filter field to lower the seasonal high water table, a more suitable soil, or an alternate system will help to overcome these limitations.

The seasonal high water table, the slope, and the low strength are the main limitations of this soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Constructing roads and streets on the contour and on raised fill of coarse-grained base material to frost depth and installing a surface and subsurface drainage system and cross culverts for surface water removal will help to overcome these limitations.

Slope, a seasonal high water table, slow permeability, high shrink-swell potential, depth to bedrock, and low strength limit most of the included soils for most uses. The included Allegheny soils with slopes of less than 8 percent have fewer limitations for most urban uses than the other included soils.

The capability subclass is IIIe.

MuC—Monongahela-Urban land complex, 3 to 15 percent slopes. This unit consists of very deep, gently sloping to strongly sloping, moderately well drained Monongahela soil and areas covered by buildings, streets, parking lots and other urban structures. The Monongahela soil commonly has seeps and "wet-weather springs." The unit is on high stream terraces mostly in the eastern and central parts of the Teays Valley. It is about 40 percent Monongahela soil, 40 percent Urban land, and 20 percent other soils. The areas of Monongahela soil and Urban land are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Monongahela soil is brown loam about 5 inches thick. The subsoil is about 49 inches thick. The upper 16 inches of the subsoil is brownish yellow loam mottled with light gray in the lower part. The lower 33 inches is a firm and very firm, brittle layer of brownish yellow and light yellowish brown loam mottled with light gray. The substratum is brownish yellow loam mottled with light gray, and it extends to a depth of 60 inches or more.

Included with this unit in mapping are a few small areas of well drained Allegheny, Gilpin, and Upshur soils and somewhat poorly drained Guyan soils. Also included are a few small areas of soil with a subsoil of reddish brown silty clay and a few areas of soil with a surface layer of silt loam.

The available water capacity of this Monongahela soil is moderate. Permeability is moderately slow or slow in the very firm part of the subsoil. Runoff is medium or rapid, and natural fertility is low. Where unlimed, the soil is strongly acid or very strongly acid. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 1.5 to 3 feet below the surface that restricts the root zone for some plants.

This unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this unit is used for urban development. The open areas are used mostly for lawns and a few home gardens.

The seasonal high water table, the moderately slow or slow permeability, slope, and low strength are the main limitations of this Monongahela soil for urban uses.

The seasonal high water table and the slope are the main limitations of this soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with a porous material will help prevent wet basements. Land shaping and grading will help to overcome the slope limitation.

The seasonal high water table and the moderately slow or slow permeability are the main limitations of this soil as a site for septic tank absorption fields. A large filter field area, a drainage system around the filter field to lower the seasonal high water table, a more suitable soil, or an alternate system will help to overcome these limitations.

The seasonal high water table and the low strength are the main limitations of this Monongahela soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Raised fill of coarse-grained base material to frost depth and a surface and subsurface drainage system and cross culverts for surface water removal will help to overcome these limitations.

Slope, a seasonal high water table, slow permeability, high shrink-swell potential, depth to bedrock, and low strength limit most of the included soils for most uses. The included Allegheny soils with slopes of less than 8 percent have fewer limitations for most urban uses than the other included soils.

This unit is not assigned a capability subclass.

Po—Pope fine sandy loam. This soil is very deep, nearly level, and well drained. It is on flood plains along the Mud River. This soil is subject to occasional flooding generally during winter and spring, before crops are planted. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark yellowish brown fine sandy loam about 8 inches thick. The subsoil is about 38 inches thick. The upper 17 inches of the subsoil is dark yellowish brown fine sandy loam, and the lower 21 inches is yellowish brown loam. The substratum is yellowish brown sandy loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin, Kanawha, and Sensabaugh soils and moderately well drained Lobdell soils. Also included are a few small areas of soil with a subsoil of loamy sand and a few soils with slopes of 3 to 8 percent. Included soils make up about 15 percent of this map unit.

The available water capacity of this Pope soil is moderate or high. Permeability is moderate or moderately rapid. Runoff is slow or medium, and natural fertility is moderate. Where unlimed, the soil is strongly acid to extremely acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Working the crop residue into the soil helps to maintain fertility and tilth. The occasional flooding generally occurs in winter and spring, but in places flooding damages crops in late spring or in summer. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management.

Flooding is the main limitation of this soil for most urban uses. It limits the soil as a site for dwellings with basements, for septic tank absorption fields, and for local roads and streets. Choosing a more suitable soil will help overcome the limitation for those uses. Raised fill and coarse-grained base material will help to overcome this limitation for roads and streets.

A seasonal high water table, occasional and rare flooding, low strength, and high frost action limit most of the included soils for most uses. The included Kanawha and Sensabaugh soils that are not flooded have few limitations for most urban uses.

The capability subclass is IIw.

SoA—Sensabaugh loam, 0 to 3 percent slopes, occasionally flooded. This soil is very deep, nearly level, and well drained. It is on flood plains along small streams and drainageways throughout the county. This soil is subject to occasional flooding generally during winter and spring, before crops are planted.

Typically, the surface layer is dark yellowish brown loam about 6 inches thick. The subsoil is about 24 inches thick. The upper 14 inches of the subsoil is dark brown gravelly loam, and the lower 10 inches is dark brown gravelly fine sandy loam. The substratum is dark brown very gravelly fine sandy loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Vandalia soils and moderately well drained Dormont and Lobdell soils. Also included are small areas of soil that is 20 to 40 inches deep to bedrock, soil subject to frequent flooding, soil subject to rare flooding, and soils with slopes of 3 to 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Cultivated crops can be grown continuously, but the soil needs the protection of a cover crop to reduce erosion. Crop residue in or on the soil helps to maintain fertility and tilth. The occasional flooding generally occurs in winter and spring, but in places crops are damaged by flooding in late spring or in summer. Proper stocking rates, rotation grazing, and deferred grazing until the soil is reasonalbly firm are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management.

The occasional flooding is the main limitation of this soil for most urban uses. It limits the soil as a site for dwellings with basements, for septic tank filter fields, and for local roads and streets. Choosing a more suitable soil will help overcome the limitations for those uses. Raised fill and coarse-grained base material will help to overcome this limitation for roads and streets.

A seasonal high water table, slip hazard, occasional flooding, rare flooding, low strength, and high frost action limit the included soils for most urban uses.

The capability subclass is IIw.

SrB—Sensabaugh loam, 3 to 8 percent slopes, rarely flooded. This soil is very deep, gently sloping, and well drained. It is on high flood plains and on alluvial fans along streams throughout the county. This soil is subject to rare flooding.

Typically, the surface layer is dark yellowish brown loam about 6 inches thick. The subsoil is about 24 inches thick. The upper 14 inches of the subsoil is dark brown gravelly loam, and the lower 10 inches is dark brown gravelly fine sandy loam. The substratum is dark brown very gravelly fine sandy loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Chagrin and Vandalia soils and moderately well drained Dormont and Lobdell soils. Also included are small areas of soil that is 20 to 40 inches deep to bedrock, soil subject to occasional flooding, soil that is not flooded, and soils with slopes of less than 3 percent or more than 8 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops or hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management.

The rare flooding is the main limitation of this soil for most urban uses. It limits the soil as a site for dwellings with basements, for septic tank absorption fields, and for local roads and streets. Choosing a more suitable soil will help overcome the limitation for those uses. Raised fill over coarse-grained base material will help overcome the limitation for roads and streets.

A seasonal high water table, slip hazard, occasional flooding, rare flooding, low strength, and high frost action limit the included soils for most urban uses.

The capability subclass is IIe.

SvC—Sensabaugh-Vandalia-Urban land complex, 3 to 15 percent slopes. This unit consists of very deep, well drained Sensabaugh and Vandalia soils and areas covered by buildings, streets, parking lots, and other urban structures. The Sensabaugh soil is subject to rare flooding, and the Vandalia soil is subject to slippage. The unit is on narrow flood plains and foot slopes along drainageways in urban areas. It is about 25 percent gently sloping Sensabaugh soil, 15 percent strongly sloping Vandalia soil, 35 percent Urban land, and 25 percent other soils. The Sensabaugh and Vandalia soils and the Urban land are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Sensabaugh soil is dark yellowish brown loam about 6 inches thick. The subsoil is about 24 inches thick. The upper 14 inches of the subsoil is dark brown gravelly loam, and the lower 10 inches is a dark brown gravelly fine sandy loam. The substratum is dark brown very gravelly fine sandy loam that extends to a depth of 60 inches or more.

Typically, the surface layer of the Vandalia soil is dark brown silt loam about 7 inches thick. The subsoil is about 34 inches thick. The upper 7 inches of the subsoil is brown gravelly silty clay loam, and the lower 27 inches is reddish brown gravelly and very gravelly silty clay loam. The substratum is reddish brown gravelly silty clay loam that extends to a depth of 60 inches or more.

Included with this unit in mapping are a few small areas of well drained Chagrin, Gilpin, and Upshur soils; moderately well drained Dormont and Lobdell soils; and somewhat poorly drained Guyan soils. Also included are a few areas of Udorthents and a few soils with slopes of less than 3 percent or more than 15 percent.

The available water capaicty of this Sensabaugh soil is moderate or high. Permeability is moderate or moderately rapid in the subsoil. Runoff is medium, and natural fertility is high. Where unlimed, the soil is medium acid to mildly alkaline. The depth to bedrock is more than 60 inches.

The available water capacity of this Vandalia soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil ranges from medium acid to very strongly acid in the surface layer and subsoil and from strongly acid to slightly acid in the substratum. The depth to bedrock is more than 60 inches. The subsoil of this Vandalia soil has a high shrink-swell potential.

This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this map unit is used for urban development. The open areas are used mostly for lawns and a few home gardens.

The rare flooding of the Sensabaugh soil and the slow permeability, slip hazard, high shrink-swell potential and low strength of the Vandalia soil are the main limitations of these soils for most urban uses.

The flooding limits the Sensabaugh soil as a site for dwellings with basements, for septic tank filter fields, and for local roads and streets. Choosing a more suitable soil will help overcome the limitation for those uses. Raised fill over coarse-grained base material will help overcome the limitation for roads and streets.

The high shrink-swell potential and slippage hazard are the main limitations of the Vandalia soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with a porous material, and keeping water away from foundations and footings with properly designed surface and subsurface drains will help to overcome the shrink-swell limitation. Erosion is a hazard in areas cleared for construction, and establishing a plant cover during or soon after construction helps to reduce erosion.

The slow permeability is the main limitation of the Vandalia soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps to overcome this limitation.

The high shrink-swell potential and the low strength are the main limitations of the Vandalia soil as a site for local roads and streets. Constructing roads and streets on the contour, using a coarse-grained base material, and installing surface drainage ditches and cross culverts for surface water removal will help to overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, a seasonal high water table, low strength, slip hazard, and high frost action limit the included soils for most urban uses.

This unit is not assigned to a capability subclass.

Ud—Udorthents, smoothed. This unit is a shallow to very deep, nearly level to very steep, well drained mixture of soil and rock fragments from areas disturbed by excavating and filling. It is mainly along Interstate 64, U.S. Route 60, West Virginia Route 2, railroads, and urban areas.

Typically, the texture of the surface layer and substratum ranges from sandy loam to clay with a wide range in kind, size, and amount of rock fragments. The depth to bedrock generally is more than 40 inches and is at least 30 feet in some fill areas. Bedrock is exposed in many of the excavated areas.

Included with this unit in mapping are a few small areas of well drained Allegheny, Ashton, Chagrin, Gilpin, Huntington, Kanawaha, Lakin, Pope, Upshur, Vandalia, and Wheeling soils; moderately well drained Cotaco, Dormont, Lindside, Lobdell, Markland, and Monongahela soils; and somewhat poorly drained Guyan soils. Also included are a few areas of rock outcrop. Included soils and rock outcrop make up about 15 percent of this map unit.

The available water capacity of this unit ranges from very low to high. Permeability is slow to very rapid in the substratum. Runoff is slow to very rapid, and natural fertility is low to high. Where unlimed, the soils are extremely acid to moderately alkaline. The depth to bedrock is more than 40 inches.

This soil has been altered to the extent that onsite investigation and testing are necessary to determine the limitations and potentials for any use. Maintaining the plant cover on this unit, establishing a plant cover on bare soils, and providing for proper disposal of surface water help to control erosion and sedimentation.

This unit is not assigned to a capability subclass.

UpC—Upshur silty clay loam, 8 to 15 percent slopes. This soil is deep, strongly sloping, and well drained. It is on ridgetops mostly in the northeast part of the county. This soil is subject to slippage. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark brown silty clay loam about 6 inches thick. The subsoil is about 33 inches thick. The upper 17 inches of the subsoil is reddish brown silty clay and clay. The next 7 inches is weak red clay. The lower 9 inches is reddish brown gravelly clay. The substratum is reddish brown channery clay. The substratum is reddish brown channery clay that extends to bedrock at a depth of about 43 inches.

Included with this soil in mapping are a few small areas of well drained Gilpin soils and moderately well drained Coolville soils. Also included are a few small areas of soils that have lost most or all of their original surface layer and a few soils with slopes of less than 8 percent or more than 15 percent. Included soils make up about 20 percent of this map unit.

The available water capacity of this Upshur soil is moderate or high. Permeability is slow in the subsoil and substratum. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, this Upshur soil is very strongly acid to slightly acid in the surface layer and upper part of the subsoil and strongly acid to moderately alkaline in the lower part of the subsoil and in the substratum. The depth to bedrock is 40 to 60 inches. The subsoil of this Upshur soil has a high shrink-swell potential, and this soil has a slip hazard.

This soil is suited to cultivated crops and to hay and pasture. Most areas are farmed. The hazard of erosion is severe in unprotected areas and is a management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue in or on the soil will help to control erosion and maintain fertility and tilth. Proper stocking rates, rotation grazing, and deferred grazing in the spring until the soil is reasonably firm are major pasture management needs.

This soil has moderate potential productivity for trees, but only a small acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a management concern, and placing the roads and trails close to the contour helps to control this erosion.

The slow permeability, the high shrink-swell potential, low strength, and the slip hazard are the main limitations of this soil for most urban uses.

The shrink-swell potential and the slip hazard are the main limitations of the soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with a porous material, and keeping water away from foundations and footings with properly designed surface and subsurface drains will help to overcome the shrink-swell limitation. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

Slow permeability is the main limitation of the soil as a site for septic tank absorption fields. A more suitable soil or an alternate system helps to overcome this limitation.

The shrink-swell potential and low strength are the main limitations of the soil as a site for local roads and streets. Coarse-grained base material and surface drainage ditches and cross culverts for surface water removal will help overcome the limitations.

Slope, depth to bedrock, high shrink-swell potential, high frost action, a seasonal high water table, low strength, and slip hazard limit the included soils for most urban uses.

The capability subclass is IVe.

Ur—Urban land. This unit consists of nearly level areas where more than 85 percent of the surface is covered by asphalt, concrete, or other impervious materials in urban areas. Examples are industrial complexes, shopping malls, business centers, parking lots, streets, and buildings. These areas are mostly in Huntington and Barboursville (fig. 6).

Included with this unit in mapping are a few small areas of well drained Allegheny, Ashton, Gilpin, Huntington, and Upshur soils; moderately well drained Cotaco, Lindside, Markland, and Monongahela soils; somewhat poorly drained Guyan soils; and poorly drained Melvin soils. Also included are a few small areas of Udorthents. Included soils make up about 15 percent of this unit.

This unit is not suited to cultivated crops, hay, pasture, or trees.

An onsite investigation of the included soils is necessary to determine limitations for specific uses. A seasonal high water table, slow permeability, occasional or rare flooding, the depth to bedrock, low strength, and high frost action limit the included soils for most urban uses.

This unit is not assigned to a capability subclass.

Us—Urban land-Ashton-Lindside complex. This unit consists of areas covered by buildings, streets, parking lots, and other urban structures and areas of very deep,

Figure 6.—The city of Huntington contains Urban land.

nearly level Ashton and Lindside soils. The unit is on flood plains along the Ohio River in Huntington. Most of it is protected from flooding by the flood wall along the Guyandotte and Ohio Rivers in Huntington. Slope ranges from 0 to 3 percent. This unit is about 50 percent Urban land, 20 percent well drained Ashton soil, 15 percent moderately well drained Lindside soil, and 15 percent other soils. The Urban land and the Ashton and Lindside soils are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Ashton soil is very dark grayish brown silt loam about 10 inches thick. The subsoil is 40 inches thick. The upper 16 inches of the subsoil is dark brown silt loam. The next 13 inches is strong brown silty clay loam. The lower 11 inches is dark brown silt loam. The substratum is dark brown silt loam and thin layers of loam and sandy loam, and it extends to a depth of 60 inches or more.

Typically, the surface layer of the Lindside soil is dark brown silt loam about 11 inches thick. The subsoil is about 24 inches thick. The upper 5 inches of the subsoil is brown silt loam, and the lower 19 inches is brown silty clay loam mottled with pinkish gray and light brownish gray. The substratum is brown silt loam and silty clay loam mottled with light brownish gray, and it extends to a depth of 60 inches or more.

Included with this unit in mapping are a few small areas of well drained Huntington, Wheeling, and

Sensabaugh soils and poorly drained Melvin soils. Also included are a few soils with slopes of 3 to 8 percent and areas of Udorthents.

The available water capacity of the Ashton soil is high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the soil is medium acid to neutral. The depth to bedrock is more than 60 inches.

The available water capacity of the Lindside soil is high. Permeability is moderate or moderately slow in the subsoil. Runoff is slow or medium, and natural fertility is high. Where unlimed, the surface layer and upper part of the subsoil are strongly acid or medium acid, and the lower part of the subsoil and the substratum are medium acid or slightly acid. The depth to bedrock is more than 60 inches. This soil has a seasonal high water table about 1.5 to 3 feet below the surface that restricts the root zone for some plants.

This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this map unit is used for urban development. The open areas are used mostly for lawns and a few home gardens.

Low strength in the Ashton soil and the seasonal high water table and high frost action of the Lindside soil are the main limitations for most urban uses.

The Ashton soil has few limitations as a site for dwellings with basements where flooding is not a hazard.

The low strength is the main limitation of the Ashton soil as a site for local roads and streets. Coarse-grained base material will help to overcome this limitation.

The seasonal high water table is the main limitation of the Lindside soil as a site for dwellings with basements. Installing foundation drains, sealing foundations, and backfilling with porous materials will help to prevent wet basements.

The seasonal high water table and high frost action are the main limitations of the Lindside soil as a site for local roads and streets. This soil is soft when wet, causing the pavement to crack under heavy traffic. Raised fill of coarse-grained base material to frost depth and surface and subsurface drainage systems and cross culverts for surface water removal will help to overcome these limitations.

A seasonal high water table, low strength, and high frost action limit the included soils for most urban uses.

This unit is not assigned to a capability subclass.

UwB—Urban land-Wheeling complex, 0 to 6 percent slopes. This unit consists of areas covered by buildings, streets, parking lots, and other urban structures and very deep, well drained Wheeling soil. The unit is on low stream terraces along the Ohio River, mainly in Huntington. It is about 55 percent Urban land, 25 percent Wheeling soil, and 20 percent other soils. The Urban land and Wheeling soil are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Wheeling soil is dark brown loam about 9 inches thick. The subsoil is 34 inches thick. The upper 18 inches of the subsoil is yellowish brown loam, and the lower 16 inches is dark yellowish brown fine sandy loam. The substratum is dark yellowish brown sandy loam and loamy sand, and it extends to a depth of 60 inches or more.

Included with this unit in mapping are a few small areas of well drained Ashton, Lakin, and Sensabaugh soils and moderately well drained Cotaco soils. Also included are a few soils with slopes of more than 6 percent and areas of Udorthents.

The available water capacity of this Wheeling soil is moderate or high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is moderate or high. Where unlimed, the soil is medium acid to strongly acid. The depth to bedrock is more than 60 inches.

This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this map unit is used for urban development. The open areas are used mostly for lawns.

Low strength and moderate frost action in the Wheeling soil are the main limitations for most urban uses.

This Wheeling soil has few limitations as a site for dwellings with basements and for septic tank absorption fields.

The low strength and moderate frost action are the main limitations of this Wheeling soil as a site for local roads and streets. Coarse-grained subgrade to frost depth helps to prevent damaged pavement caused by the frost action and low strength.

A seasonal high water table, rare flooding, low strength, poor filter, and slope limit the included soils for most urban uses.

This unit is not assigned to a capability subclass.

VaD—Vandalia silt loam, 15 to 25 percent slopes. This soil is very deep moderately steep, and well drained. It is on foot slopes, in upland drainageways, and in coves in the northern and central parts of the county. This soil is subject to slippage. One-fourth to three-fourths of the original surface layer has been removed by erosion.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 34 inches thick. The upper 7 inches of the subsoil is brown gravelly silty clay loam, and the lower 27 inches is reddish brown gravelly and very gravelly silty clay loam. The substratum is reddish brown gravelly silty clay loam that extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Gilpin, Sensabaugh, and Upshur soils and moderately well drained Dormont and Lobdell soils. Also included are a few small areas of soils that have lost most or all of their original surface layer and soils with slopes of less than 15 percent or more than 25 percent. Bedrock escarpments are in some areas, and stones cover 1 to 3 percent of the surface of some areas. Included soils and bedrock escarpments make up about 30 percent of this map unit.

The available water capacity of this Vandalia soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil ranges from medium acid to very strongly acid in the surface layer and subsoil and from strongly acid to slightly acid in the substratum. The depth to bedrock is more than 60 inches. The subsoil of this Vandalia soil has a high shrink-swell potential.

This soil has limited suitability for cultivated crops and is better suited to hay and pasture. Most open areas are used for hay and pasture. The hazard of erosion is severe in unprotected areas and is a major management concern. If this soil is cultivated, conservation tillage, contour stripcropping, a crop sequence that includes hay, a cover crop, and crop residue on or in the soil help to control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, and about half of the acreage is wooded. The use of equipment is restricted during wet seasons because the soil is soft and slippery. Erosion on logging roads and skid trails is a major management concern, and placing the roads and trails close to the contour helps to control this erosion.

Slope, the slow permeability, the slip hazard, the high shrink-swell potential, and low strength are the main limitations of this soil for most urban uses.

The shrink-swell potential, slope, and slip hazard are the main limitations of this soil as a site for dwellings with basements. Using extra reinforcement in footers, backfilling with a porous material, and keeping water away from foundations and footers with properly designed surface and subsurface drains will help to overcome the shrink-swell limitation. Keeping surface and subsurface water away from the building site and avoiding soil disturbance will help to avoid the slip hazard. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

The slow permeability, slip hazard, and slope are the main limitations of the Vandalia soil as a site for septic tank absorption fields. A large lot of more favorable soils or an alternate system helps overcome these limitations.

The shrink-swell potential, slope, and low strength are the main limitations of the Vandalia soil as a site for local roads and streets. Constructing roads and streets on the contour, using a coarse-grained base material, and installing surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, a seasonal high water table, low strength, and a slip hazard limit most of the included soils as sites for dwellings with basements, for septic tank absorption fields, and for local roads and streets. The included Sensabaugh soils that are rarely flooded have few limitations for most urban uses.

The capability subclass is IVe.

VuD—Vandalia-Urban land complex, 8 to 25 percent slopes. This unit consists of very deep, well drained Vandalia soil and areas covered by buildings, streets, parking lots, and other urban structures. The unit is on foot slopes in urban areas, mostly in Huntington and along West Virginia Route 2. It is about 40 percent Vandalia soil, 40 percent Urban land, and 20 percent other soils. The Vandalia soil, which is subject to slippage, and the Urban land are in such an intricate pattern that it was not practical to map them separately.

Typically, the surface layer of the Vandalia soil is dark brown silt loam about 7 inches thick. The subsoil is 34 inches thick. The upper 7 inches of the subsoil is brown gravelly silty clay loam, and the lower 27 inches is reddish brown gravelly and very gravelly silty clay loam. The substratum is reddish brown gravelly silty clay loam to a depth of 60 inches or more.

Included with this unit in mapping are a few small areas of well drained Gilpin, Sensabaugh, and Upshur soils and moderately well drained Dormont and Lobdell soils. Also included are soils with slopes of more than 25 percent, a few small areas of bedrock escarpments, and areas of Udorthents.

The available water capacity of this Vandalia soil is moderate or high. Permeability is slow in the subsoil. Runoff is rapid, and natural fertility is moderate or high. Where unlimed, the soil ranges from medium acid to very strongly acid in the surface layer and subsoil and from strongly acid to slightly acid in the substratum. The depth to bedrock is more than 60 inches. The subsoil of this Vandalia soil has a high shrink-swell potential.

This map unit is not suited to cultivated crops, hay, pasture, or woodland. Most of this unit is used for urban development (fig. 7). The open areas are used mostly for lawns and a few home gardens.

Slope, the slow permeability, the slip hazard, the high shrink-swell potential, and low strength are the main limitations of the Vandalia soil for most urban uses.

The shrink-swell potential, slope, and slip hazard are the main limitations of this soil as a site for dwellings with basements. Using extra reinforcement in footings, backfilling with a porous material, and keeping water away from foundations and footings with properly designed surface and subsurface drains will help to overcome the shrink-swell limitation. Keeping surface and subsurface water away from the building site and avoiding soil disturbance will help to avoid the slip

Figure 7.—An area of Vandalia-Urban land complex, 8 to 25 percent slopes.

hazard. Erosion is a hazard in areas cleared for construction. Establishing a plant cover during or soon after construction will help reduce erosion.

The slow permeability, slip hazard, and slope are the main limitations of the Vandalia soil as a site for septic tank absorption fields. A large lot of more favorable soils or an alternate system helps overcome the limitations.

The shrink-swell potential, slope, and low strength are the main limitations of the Vandalia soil as a site for local roads and streets. Constructing roads and streets on the contour, using a coarse-grained base material, and installing surface drainage ditches and cross culverts for surface water removal will help overcome these limitations.

Slope, depth to bedrock, high shrink-swell potential, a seasonal high water table, low strength, and a slip hazard limit most of the included soils as sites for dwellings with basements, for septic tank absorption fields, and for local roads and streets. The included Sensabaugh soils that are rarely flooded have few limitations for most urban uses.

This unit is not assigned to a capability subclass.

WhB—Wheeling loam, 0 to 6 percent slopes. This soil is very deep, nearly level to gently sloping, and well drained. It is on low stream terraces along the Ohio River.

Typically the surface layer is dark brown loam about 9 inches thick. The subsoil is 34 inches thick. The upper 18 inches of the subsoil is yellowish brown loam, and the lower 16 inches is dark yellowish brown fine sandy loam. The substratum is dark yellowish brown sandy loam and loamy sand, and it extends to a depth of 60 inches or more.

Included with this soil in mapping are a few small areas of well drained Ashton and Lakin soils and moderately well drained Cotaco soils. Also included are a few small areas of soil with a surface layer of silt loam and a subsoil of silt loam, a few areas of soils that have lost most or all of their original surface layer, a few soils with slopes of more than 6 percent, and a few areas of Udorthents. Included soils make up about 20 percent of this map unit.

The available water capacity of this Wheeling soil is moderate or high. Permeability is moderate in the subsoil. Runoff is slow or medium, and natural fertility is moderate or high. Where unlimed, the soil is medium acid or strongly acid. The depth to bedrock is more than 60 inches.

This soil is suited to cultivated crops and to hay and pasture. Most areas are used for cultivated crops or hay. The hazard of erosion is moderate in unprotected areas and is a management concern. If the soil is cultivated, contour stripcropping, a crop sequence that includes hay. a cover crop, and crop residue on or in the soil help control erosion and maintain fertility and tilth. Proper stocking rates and rotation grazing are major pasture management needs.

This soil has moderately high potential productivity for trees, but only a small acreage is wooded. This soil has few limitations for woodland management. Most wooded areas are not large enough for commercial wood production.

Low strength and moderate frost action are the main limitations of this soil for most urban uses.

This soil has few limitations as a site for dwellings with basements and for septic tank absorption fields.

The low strength and moderate frost action are the main limitations of this soil as a site for local roads and streets. Coarse-grained base material to frost depth helps to prevent damaged pavement caused by the frost action and low strength.

A seasonal high water table, rare flooding, low strength, poor filter, and slope limit the included soils for most urban uses.

The capability subclass is IIe.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 8 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 14,730 acres of prime farmland. That acreage makes up about 8 percent of the total acreage in the survey area and is throughout the county.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Dixie L. Shreve, resource conservationist, Soil Conservation Service, assisted with the preparation of this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Some general principles of management apply throughout the survey to all soils suitable for farm crops and pasture, although the individual soils or groups of soils require different kinds of management.

Most of the soils in the survey area have a moderate or low supply of basic plant nutrients, making the application of lime and fertilizer necessary. The amounts to be applied depend on the type of soil, crop history, the type of crop grown, the level of desired yield, and the tests and analyses of the soil and plants.

The organic matter content is low in most soils, and it is not feasible to increase it. It is important, however, to maintain the current level by adding farm manure, by using crop residue in and on the soil, and by growing sod crops, cover crops, and green-manure crops.

Tillage tends to break down soil structure and should be kept to the minimum necessary to prepare the seedbed and control weeds. Maintaining the organic matter content of the plow layer also helps to protect the structure.

Artificial drainage is needed in some soils to make them suitable for cultivated crops, hay, and pasture. Soils with a dense, brittle layer or a clayey texture in the subsoil are difficult to drain with tile. Such soils generally respond better to open-ditch drainage.

Runoff and erosion occur mainly while a cultivated crop is growing or soon after it has been harvested. All of the gently sloping and steeper soils that are cultivated are subject to erosion and thus require a suitable cropping system for erosion control. The main management needs of such a system are the proper rotation of crops, minimum tillage, mulch planting, using crop residue, growing cover crops and green-manure crops, and using lime and fertilizer. Other major erosion-control practices are contour cultivation, contour stripcropping, diverting runoff, and using grassed waterways. The effectiveness of a particular combination of these measures differs from one soil to another, but different combinations can be equally effective on the same soil.

Using the soil for pasture is effective in controlling erosion in most areas. A high level of pasture management, including fertilization, controlled grazing, and careful selection of pasture mixtures, is needed on some soils to provide enough ground cover to prevent erosion. Grazing is controlled by rotating the livestock from one pasture to another and providing idle periods for the pasture to allow regrowth of the plants. Some soils need pasture mixtures that require the least renovation to maintain good ground cover and forage for grazing.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. The levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

C. Lewis Rowan, staff forester, Soil Conservation Service, and Larry Six, forester, West Virginia Department of Natural Resources, helped prepare this section.

The county has about 131,400 acres, or about 72 percent of the total acreage, of woodland, most of which is privately owned and in small lots. The most common forest types, or natural associations of tree species, and their percentage of the wooded area are the oak-hickory type, about 61 percent; the maple-beech-birch type, about 13 percent; other hardwood types, about 16 percent; and pine types, about 10 percent (*7*). Nearly 38 percent of the woodland in the county is classified as saw timber.

The aspects of some soils, generally those having slopes of more than 15 percent, are shown in table 8. North aspects are those that face in any compass direction from 315 degrees to 135 degrees. South aspects are those that face in any compass direction from 135 degrees to 315 degrees. Aspect affects potential productivity of sloping soils. The soils on north aspects generally are more moist than those on south aspects and usually have a higher site index. Aspect also affects the occurrence of a tree species and the degree of management concerns.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R,X,W,T,D,C,S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 16. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occuring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Plant competition is the likelihood of the invasion or growth of undesirable species where openings are made in the canopy. The main factors that affect plant competition are depth to the water table and available water capacity of the soil. A rating of *slight* indicates that competition from unwanted plants is not likely to suppress the more desirable species or prevent their natural regeneration. Planted seedlings have good prospects for development without undue competition. A rating of *moderate* indicates that competition may delay the natural regeneration of desirable species or of planted trees and may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent natural regeneration or restrict planted seedlings unless precautionary measures are taken.

Adequate site preparation before planting the new crop can help reduce plant competition.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. *Site index* is the average height, in feet, that dominant and codominant trees of a given species attain in 50 years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability. *Average annual growth* per acre of some of the common trees is given in cubic feet, board feet, and cords.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 9 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 9 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

Michael Marks, district conservationist, Soil Conservation Service, helped prepare this section.

Cabell County offers a wide variety of recreation facilities. Parks, campgrounds, golf courses, game courts, picnic areas, and other facilities are available to the public. Rotary and Ritter Parks are maintained by the Greater Huntington Park and Recreation District. The State of West Virginia maintains Beech Fork State Park. The U.S. Army Corps of Engineers and the West Virginia Department of Natural Resources maintain two riverside parks and boat launch areas along the Ohio River in addition to marinas, recreation areas, and public hunting areas at nearby Beech Fork Lake, East Lynn Lake, and Cornstalk Public Hunting Area. The Ohio River, the Guyandotte River, and the Mud River and their tributaries offer potential for fishing, boating, and hunting of waterfowl.

The soils of the survey area are rated in table 10 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 10, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 10 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Gary A. Gwinn, biologist, Soil Conservation Service, helped prepare this section.

The numbers and types of wildlife species and game animals in Cabell County are typical of those in much of West Virginia. Woodland game species, for example, gray squirrel and ruffed grouse, are common. The white-tailed deer population is rapidly expanding, and cottontail rabbits are throughout the county.

The population of openland wildlife species, such as quail, is limited because of the decrease in farmland, their main habitat. The dove population, however, is among the largest in the State, as is the waterfowl population, though it is not considered in the same class as those found in the traditional flyways. The county has a large number of Canada geese, mainly as a result of a transplant program instigated by the West Virginia Department of Natural Resources. Other waterfowl species are in large numbers along the Guyan Creek and the Ohio and Guyandotte Rivers.

Native furbearers and most indigenous nongame species are common in all parts of the county. The populations of woodchucks and crows are large, as are those of fox, muskrat, songbirg, and small mammals.

Local streams, rivers, and ponds support various species of warmwater fish. The common game species are largemouth bass, smallmouth bass, striped bass, channel catfish, crappie, sauger, bluegill, and other pan fish. Most streams in the county also support numerous nongame species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 11, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, bluegrass, orchardgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, panicgrass, foxtail, wild carrot, quackgrass, and ragweed.

Hardwood trees and shrubs produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, silky dogwood, blueberry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, yew, red cedar, and hemlock.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, cattails, cutgrass, bulrushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, swamps, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadow vole, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, frogs, and tree swallow.

Engineering

James L. Dove, engineer, Soil Conservation Service, assisted with the preparation of this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, soil density, shear strength, bearing strength, and consolidation. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, impoundments and topsoil; (7) plan drainage systems, irrigation systems, ponds, agricultural waste storage structures, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 12 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 13 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 13 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 13 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 13 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 14 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 14, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, toxic substances, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 16 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 18 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 18 gives the estimated frequency of flooding. It generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year).

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 18 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 18.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table-Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*6*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Alfisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udalf (*Ud*, meaning humid, plus *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *udalf*, the suborder of the Alfisols that have a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, mesic Typic Hapludalfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

Dr. John Sencindiver, associate professor of agronomy, West Virginia Agricultural and Forestry Experiment Station, assisted with the preparation of this section.

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*5*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*6*). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Allegheny Series

The Allegheny series consists of deep, well drained soils formed in acid alluvial material washed from soils on uplands. The Allegheny soils are on high stream terraces in the Teays Valley. Slope ranges from 3 to 15 percent.

Allegheny soils are on the landscape with Gilpin, Monongahela, and Upshur soils. Allegheny soils are deeper to bedrock than Gilpin soils. They have better natural drainage than Monongahela soils, and they do not have a fragipan which is characteristic of the Monongahela soils. They have less clay in the subsoil and the substratum than Upshur soils.

Typical pedon of Allegheny loam, bedrock substratum, 8 to 15 percent slopes, in a pasture about 200 yards southeast of U.S. Route 60, about 335 yards east of West Virginia Route 60/39:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam; weak fine and medium granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

Bt1—8 to 14 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; many fine and medium roots; few distinct clay films on faces of peds; medium acid; clear wavy boundary.

Bt2—14 to 30 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; strongly acid; clear wavy boundary.

BC—30 to 36 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine roots; very strongly acid; gradual wavy boundary.

C—36 to 50 inches; strong brown (7.5YR 5/6) sandy loam; massive; friable; extremely acid; clear wavy boundary.

R—50 inches; shale and siltstone.

The solum thickness ranges from 30 to 55 inches, and the depth to bedrock ranges from 40 to 60 inches. The content of rock fragments of gravel ranges from 0 to 10 percent in the Ap and Bt horizons and 0 to 20 percent in the BC and C horizons. In unlimed areas the soil is strongly acid to extremely acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is loam or clay loam.

The BC horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. The fine-earth material is fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 8. It is commonly sandy loam or loam in the fine-earth fraction but in some areas is stratified layers ranging from loamy sand through clay loam.

Ashton Series

The Ashton series consists of very deep, well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Ashton soils are on high flood plains along the Ohio River. Slope ranges from 0 to 8 percent.

Ashton soils are on the landscape with Chagrin, Cotaco, Huntington, Lindside, Melvin, and Wheeling soils. Ashton soils are fine-silty; Chagrin, Cotaco, and Wheeling soils are fine-loamy. Ashton soils have better natural drainage than Cotaco, Lindside, or Melvin soils, and they are flooded less frequently than Chagrin, Huntington, Lindside, or Melvin soils. Ashton soils are subject to flooding, but Cotaco and Wheeling soils typically are not.

Typical pedon of Ashton silt loam, 0 to 3 percent slopes, in a cultivated field about 400 yards north of West Virginia Route 2, about 2.5 miles west of the Mason County line:

Ap—0 to 10 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; very friable; many fine roots; slightly acid; abrupt smooth boundary.

BA—10 to 15 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

Bt1—15 to 26 inches; dark brown (7.5YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—26 to 39 inches; strong brown (7.5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; many distinct clay films on faces of peds; slightly acid; clear wavy boundary.

BC—39 to 50 inches; dark brown (7.5YR 4/4) silt loam; weak coarse subangular blocky structure; friable; common distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

C—50 to 65 inches; dark brown (7.5YR 4/4) silt loam; thin layers of loam and sandy loam; massive; friable; slightly acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Some pedons contain up to 5 percent rock fragments in individual subhorizons. In unlimed areas the soil is medium acid to neutral.

The Ap horizon has hue of 10YR or 7.5YR, value of 3, and chroma of 2 or 3.

The BA horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4. It is silt loam.

The Bt and BC horizons have hue of 7.5YR, value of 4 or 5, and chroma of 3 through 6. They are silt loam or silty clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 3 through 6. It is silt loam, silty clay loam, loam, or fine sandy loam.

Chagrin Series

The Chagrin series consists of very deep, well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Chagrin soils are on flood plains throughout the county. Slope ranges from 0 to 3 percent.

Chagrin soils are on the landscape with Ashton, Huntington, Kanawha, Lindside, Lobdell, Melvin, Pope, and Sensabaugh soils. Chagrin soils are fine-loamy; Ashton, Huntington, Lindside, and Melvin soils are fine-silty, and Pope soils are coarse-loamy. Chagrin soils have better natural drainage than Lindside, Lobdell, or Melvin soils. Chagrin soils are flooded more frequently than Ashton soils and some areas of Sensabaugh soils, and they have less gravel in the subsoil than Sensabaugh soils. Chagrin soils also are flooded more frequently than those Kanawha soils that are not protected from flooding.

Typical pedon of Chagrin silt loam, 0 to 3 percent slopes, in a hayfield about 250 yards north of West Virginia Route 7/1, about 25 yards west of Guyan Creek:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; neutral; clear smooth boundary.

BA—8 to 16 inches; brown (7.5YR 5/4) silt loam; weak fine and medium subangular blocky structure; very friable; common fine and medium roots; neutral; clear wavy boundary.

Bw1—16 to 26 inches; strong brown (7.5YR 5/6) silt loam; weak and moderate medium subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

Bw2—26 to 41 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; slightly acid; clear wavy boundary.

C—41 to 65 inches; brown (7.5YR 5/4) loam; massive; friable; medium acid.

The solum thickness ranges from 28 to 45 inches, and the depth to bedrock is more than 60 inches. Some pedons are up to 10 percent rock fragments in individual subhorizons. In unlimed areas the soil is medium acid to neutral.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 2 through 4. It is silt loam or loam.

The BA and Bw horizons have hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. They are mainly silt loam or loam, but in some areas of Chagrin, overwash, they are fine sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 2 through 6. It is silt loam, loam, or sandy loam and is stratified in some pedons.

Coolville Series

The Coolville series consists of deep, moderately well drained soils formed in material weathered mainly from shale, siltstone, and some sandstone. These soils are on broad ridgetops mainly in the northern part of the county. Slope ranges from 3 to 8 percent.

Coolville soils are on the landscape with Gilpin, Lily, and Upshur soils. Coolville soils have poorer natural drainage than all of those soils. Coolville soils are clayey; Gilpin and Lily soils are fine-loamy.

Typical pedon of Coolville silt loam, 3 to 8 percent slopes, in cultivated field about 200 yards south of the Mason County line, about 400 yards northwest of West Virginia Route 13:

Ap—0 to 8 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; many fine roots; few distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—17 to 25 inches; light olive brown (2.5Y 5/4) silty clay loam; common fine light gray (10YR 7/2) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

2Bt3—25 to 33 inches; red (2.5YR 5/6) silty clay; many fine pinkish white (5YR 8/2) mottles; weak medium subangular blocky structure; friable to firm; common fine roots; many distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

2BC—33 to 40 inches; reddish gray (5YR 5/2) and strong brown (7.5YR 5/8) silty clay; common fine red (2.5YR 5/6) mottles; weak medium and coarse prismatic structure parting to fine subangular blocky; friable to firm; 10 percent rock fragments; few fine roots; few distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

2C—40 to 55 inches; light gray (10YR 7/1) silty clay; few fine brownish yellow (10YR 6/6) mottles; massive; firm; 10 percent rock fragments; very strongly acid; gradual wavy boundary.

2Cr—55 inches; soft light gray shale.

The solum thickness ranges from 36 to 46 inches. The depth to bedrock ranges from 40 to 60 inches. Rock fragments of shale, ironstone, siltstone, and some sandstone make up 0 to 5 percent of the Ap and B horizons, up to 15 percent of the 2B horizon, and up to 30 percent of the 2BC and 2C horizons. In unlimed areas the soil is medium acid to extremely acid in the A horizon, strongly acid to extremely acid in the B horizon and upper part of the 2B horizon, and strongly acid or very strongly acid in the lower part of the 2B horizon and in the C horizon.

The Ap horizon has hue of 10YR, value 4 or 5, and chroma of 2 or 3.

The Bt horizon has hue of 2.5Y through 7.5YR, value of 4 or 5, and chroma of 4 through 6. It is silt loam or silty clay loam.

The 2Bt horizon has hue of 2.5YR through 7.5YR, value of 4 through 6, and chroma of 2 through 8. It is silty clay or clay.

The 2BC horizon has hue of 2.5YR through 7.5YR, value of 4 or 5, and chroma of 2 through 8. The fine-earth fraction is silty clay loam or silty clay.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 8, and chroma of 1 through 7. The fine-earth fraction is silty clay loam or silty clay.

Cotaco Series

The Cotaco series consists of very deep, moderately well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Cotaco soils are on low stream terraces along the Ohio, Mud, and Guyandotte Rivers. Slope ranges from 3 to 8 percent.

Cotaco soils are on the landscape with Ashton, Guyan, Kanawha, Lakin, Markland, and Wheeling soils. Cotaco soils are fine-loamy; Ashton soils are fine-silty, Lakin soils are sandy, and Markland soils are clayey. Cotaco soils have poorer natural drainage than Ashton, Kanawha, Lakin, or Wheeling soils. They have better natural drainage than Guyan soils.

Typical pedon of Cotaco silt loam, 3 to 8 percent slopes, in a cultivated field about 200 yards west of West Virginia Route 2, about 660 yards south of Lunsford Lane, in Greenbottom:

Ap—0 to 8 inches; dark brown (10YR 4/3) silt loam; moderate fine and medium granular structure; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

AB—8 to 15 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear smooth boundary.

Bt1—15 to 25 inches; yellowish brown (10YR 5/4) loam; common medium light gray (10YR 7/1) mottles; weak and moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; common medium iron and manganese concretions; strongly acid; clear wavy boundary.

Bt2—25 to 39 inches; yellowish brown (10YR 5/4) clay loam; many medium light gray (10YR 7/2) mottles; weak moderate subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; many medium iron and manganese concretions; strongly acid; gradual wavy boundary.

BC—39 to 45 inches; yellowish brown (10YR 5/4) and brown (7.5YR 4/4) loam; common fine light gray (10YR 7/1) mottles; weak coarse subangular blocky structure; friable; few fine roots; many medium iron and manganese concretions; very strongly acid; gradual wavy boundary.

C—45 to 65 inches; yellowish brown (10YR 5/4) and brown (7.5YR 4/4) loam; common fine light gray (10YR 7/1) mottles; massive; friable; strongly acid.

The solum thickness ranges from 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments commonly is 0 to 2 percent, but the range is from 0 to 15 percent in individual subhorizons. In unlimed areas the soils are strongly acid to extremely acid.

The Ap and AB horizons have hue of 10YR, value of 3 through 5, and chroma of 2 through 4.

The Bt and BC horizons have hue of 2.5Y through 7.5YR, value of 4 through 6, and chroma of 3 through 8. They are loam or clay loam.

The C horizon has hue of 2.5Y through 7.5YR, value of 4 through 6, and chroma of 1 through 7. It is loam or clay loam. The C horizon is stratified in some pedons.

Dormont Series

The Dormont series consists of very deep, moderately well drained soils formed in limy colluvial material that has moved downslope from soils on uplands. The Dormont soils are on foot slopes, along the base of steeper slopes, and around the heads of drainageways in the central and southern parts of the county. Slope ranges from 15 to 25 percent.

Dormont soils are on the landscape with Gilpin, Lobdell, Sensabaugh, Upshur, and Vandalia soils. Dormont soils are deeper to bedrock than Gilpin soils, and they have poorer natural drainage than Gilpin, Upshur, or Vandalia soils. Dormont soils are fine-loamy; Upshur and Vandalia soils are clayey. Dormont soils do not have a flood hazard that is characteristic of Lobdell and Sensabaugh soils.

Typical pedon of Dormont silt loam, 15 to 25 percent slopes, in a wooded area about 350 yards east of the Guyandotte River, about 100 yards north of Tom Creek, near Roach:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak fine subangular blocky structure parting to weak fine and medium granular; very friable; many fine and medium roots; 10 percent rock fragments; strongly acid; abrupt smooth boundary.

Bt1—6 to 20 inches; yellowish brown (10YR 5/6) gravelly silty clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—20 to 26 inches; brownish yellow (10YR 6/6) very channery silty clay loam; few fine light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 40 percent rock fragments; very strongly acid; clear wavy boundary.

Bt3—26 to 36 inches; yellowish brown (10YR 5/6) channery silty clay loam; many fine and medium light gray (10YR 7/2) mottles; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; firm; few fine and medium roots; common distinct clay films on faces of peds; common manganese and iron concretions and coatings; 25 percent rock fragments; very strongly acid; clear wavy boundary.

Bt4—36 to 51 inches; yellowish brown (10YR 5/6) channery silty clay loam; many medium and coarse reddish brown (5YR 5/4) and light gray (10YR 7/2) mottles and coatings; weak medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; firm; few fine roots; common distinct clay films on faces of peds; common manganese and iron concretions and coatings; 25 percent rock fragments; very strongly acid; clear wavy boundary.

C—51 to 65 inches; yellowish brown (10YR 5/6) channery clay loam; many fine and medium light gray (10YR 7/1) mottles; massive; friable; many manganese and iron concretions and coatings; 25 percent rock fragments; strongly acid.

The solum thickness ranges from 36 to 60 inches. The depth to bedrock is more than 60 inches. Rock fragments of shale, siltstone, and sandstone make up 0 to 20 percent of the A horizon, 5 to 20 percent of the upper part of the B horizon, 5 to 40 percent of the lower part of the B horizon, and 5 to 50 percent of the C horizon. In unlimed areas this soil is very strongly acid to medium acid in the solum and strongly acid or medium acid in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 through 5, and chroma of 2 through 4.

The Bt horizon has hue of 10YR or 7.5YR and value and chroma of 4 through 6. In the fine-earth fraction it is silt loam, loam, silty clay loam, or clay loam.

The C horizon has hue of 7.5YR or 10YR and value and chroma of 4 through 6. In the fine-earth fraction it is loam, silt loam, clay loam, silty clay loam, or silty clay.

Gilpin Series

The Gilpin series consists of moderately deep, well drained soils formed in acid material weathered from interbedded siltstone, shale, and sandstone. The Gilpin soils are on ridgetops, knobs, benches, and side slopes. Slope ranges from 8 to 65 percent.

Gilpin soils are on the landscape with Allegheny, Coolville, Dormont, Lily, Monongahela, Upshur, and Vandalia soils. Gilpin soils are less deep to bedrock than Allegheny or Dormont soils. They have better natural drainage than Coolville, Dormont, or Monongahela soils. Gilpin soils are fine-loamy; Coolville, Upshur, and Vandalia soils are clayey. Gilpin soils have less sand in the subsoil than Lily soils, and they do not have a fragipan, which is characteristic of the Monongahela soils.

Typical pedon of Gilpin silt loam, 25 to 35 percent slopes, in a wooded area about 600 yards east of the junction of West Virginia Routes 20 and 34.

Oi—2 inches to 1 inch; hardwood leaf litter.

Oa—1 inch to 0; highly decomposed leaves and litter.

A—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine and medium roots; 5 percent rock fragments; very strongly acid; abrupt wavy boundary.

BA—6 to 9 inches; yellowish brown (10YR 5/6) silt loam; weak fine and medium subangular blocky structure; very friable; many fine and medium roots; 10 percent rock fragments; very strongly acid; clear wavy boundary.

Bt1—9 to 14 inches; strong brown (7.5YR 5/6) channery loam; weak medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 20 percent rock fragments; very strongly acid; clear wavy boundary.

Bt2—14 to 21 inches; strong brown (7.5YR 5/6) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; 30 percent rock fragments; strongly acid; clear smooth boundary.

BC—21 to 34 inches; strong brown (7.5YR 5/6) very channery loam; weak medium subangular blocky structure; friable; few medium roots; 35 percent rock fragments; strongly acid; clear smooth boundary.

C—34 to 38 inches; strong brown (7.5YR 5/6) very channery loam; massive; friable; 50 percent rock fragments; strongly acid; abrupt wavy boundary.

R—38 inches; shale and siltstone.

The solum thickness ranges from 20 to 36 inches, and the depth to bedrock is 20 to 40 inches. Shale, siltstone, and sandstone rock fragments make up 5 to 40 percent of the solum and 30 to 80 percent of the C horizon. In unlimed areas this soil is strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4.

The BA, Bt, and BC horizons have hue of 7.5YR through 2.5Y, value of 5, and chroma of 6 through 8. In the fine-earth fraction they are silt loam, loam, or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 through 8. In the fine-earth fraction it is loam or silt loam.

Guyan Series

The Guyan series consists of very deep, somewhat poorly drained soils formed in alluvial material washed from acid soils on uplands. The Guyan soils are on low stream terraces along the Mud River, the Guyandotte River, and the Guyan Creek. Slope ranges from 0 to 3 percent.

Guyan soils are on the landscape with Cotaco, Kanawha, and Markland soils. Guyan soils have poorer natural drainage than all of those soils. Guyan soils are fine-loamy; Markland soils are clayey.

Typical pedon of Guyan silt loam, 0 to 3 percent slopes, in a pasture approximately 1,100 yards west of the junction of West Virginia Route 1 and U.S. Highway 60, about 180 yards north of the Mud River:

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; medium acid; abrupt smooth boundary.

BA—6 to 9 inches; light yellowish brown (2.5Y 6/4) silt loam; common fine light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bt1—9 to 14 inches; brownish yellow (10YR 6/6) loam; common fine and medium light gray (2.5Y 7/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—14 to 34 inches; mottled light gray (2.5Y 7/2) and brownish yellow (10YR 6/6) clay loam; moderate medium and coarse subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt3—34 to 48 inches; mottled light gray (10YR 7/1) and strong brown (7.5YR 5/6) clay loam; moderate medium prismatic structure parting to weak coarse subangular blocky; firm; few fine roots; few distinct clay films on faces of peds and in pores; common small black concretions; very strongly acid; gradual wavy boundary.

C—48 to 65 inches; mottled light gray (10YR 7/1) and yellowish brown (10YR 5/6) silty clay loam; massive; firm; many small black concretions; very strongly acid.

The solum thickness is dominantly 40 to 60 inches but ranges from 30 to 60 inches. The depth to bedrock is more than 60 inches. The gravel content ranges from 0 to 10 percent throughout the solum. Reaction ranges from very strongly acid to neutral in the Ap and BA horizons and is strongly acid or very strongly acid in the Bt and C horizons.

The Ap horizon has hue of 2.5Y or 10YR, value of 3 through 5, and chroma of 2 through 4.

The BA horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 through 4.

The Bt horizon has hue of 2.5Y through 7.5YR, value of 5 through 7, and chroma of 1 through 6. It is silt loam, loam, clay loam, or silty clay loam.

The C horizon has hue of 2.5Y through 7.5YR, value of 4 through 7, and chroma of 1 through 8. It mainly is silt loam, loam, clay loam, or silty clay loam. In some pedons the C horizon is stratified and contains strata of silty clay.

Huntington Series

The Huntington series consists of very deep, well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Huntington soils are on flood plains along the Ohio River. Slope ranges from 0 to 3 percent.

Huntington soils are on the landscape with Ashton, Chagrin, Lindside, and Melvin soils. Huntington soils are flooded more frequently than Ashton soils. Huntington soils are fine-silty; Chagrin soils are fine-loamy. Huntington soils have better natural drainage than Lindside or Melvin soils.

Typical pedon of Huntington silt loam, in a crop field about 850 yards north of West Virginia Route 2, about 2.5 miles west of the Mason County line:

Ap—0 to 14 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; weak coarse subangular blocky structure parting to weak fine and medium granular; very friable; many fine and medium roots; slightly acid; clear wavy boundary.

BA—14 to 20 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; common fine roots; neutral; clear wavy boundary.

Bw—20 to 34 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium subangular blocky structure; friable; common fine roots; neutral; clear wavy boundary.

BC—34 to 44 inches; dark brown (10YR 4/3) silt loam; weak coarse subangular blocky structure; friable; few fine roots; neutral; gradual wavy boundary.

C—44 to 65 inches; dark brown (10YR 4/3) silt loam; massive; friable; neutral.

The solum thickness ranges from 40 to 50 inches, and the depth to bedrock is more than 60 inches. Some pedons contain up to 3 percent rock fragments in the solum. Reaction ranges from medium acid to mildly alkaline.

The Ap horizon has hue of 10YR to 7.5YR and value and chroma of 2 or 3.

The BA horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3.

The Bw and BC horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is silt loam, loam, or fine sandy loam.

Kanawha Series

The Kanawha series consists of very deep, well drained soils formed in alluvial materials washed from limy and acid soils on uplands. The Kanawha soils are on high flood plains and low terraces along the Guyandotte River and the Mud River. These soils are protected from flooding along the Guyandotte River by the R. D. Bailey Dam. The Kanawha soils along the Mud River are subject to rare flooding. Slope ranges from 0 to 8 percent.

Kanawha soils are on the landscape with Chagrin, Cotaco, Guyan, and Markland soils. Some Kanawha soils are not flooded, and other Kanawha soils are flooded less frequently than Chagrin soils. Kanawha soils have better natural drainage than Cotaco, Guyan, or Markland soils. Kanawha soils are fine-loamy; Markland soils are clayey.

Typical pedon of Kanawha loam, 0 to 3 percent slopes, protected, in a cultivated field about 0.4 mile south of the Cabell County 4-H Camp, about 0.1 mile east of the Guyandotte River.

Ap—0 to 11 inches; dark brown (10YR 4/3) loam; weak medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine and medium roots; neutral; abrupt smooth boundary.

Bt1—11 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; slightly acid; clear wavy boundary.

Bt2—27 to 35 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; common distinct clay films on faces of peds; medium acid; gradual wavy boundary.

BC—35 to 45 inches; yellowish brown (10YR 5/6) loam; weak coarse subangular blocky structure; friable; few fine roots; medium acid; gradual wavy boundary.

C—45 to 65 inches; yellowish brown (10YR 5/6) loam; massive; friable; medium acid.

The solum thickness ranges from 40 to 55 inches, and the depth to bedrock is more than 60 inches. Some pedons contain up to 10 percent rock fragments in individual subhorizons. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid or slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value of 4, and chroma of 3 or 4.

The Bt and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 8. They mainly are loam, silt loam, or clay loam. Some thin subhorizons are sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. It is loam, fine sandy loam, or sandy clay loam.

Lakin Series

The Lakin series consists of very deep, excessively drained soils formed in coarse-textured eolian or alluvial materials from limy and acid soils on uplands. The Lakin soils are on terraces along the Ohio River. Some areas adjacent to the hills are hummocky. Slope ranges from 3 to 15 percent.

Lakin soils are on the landscape with Cotaco, Vandalia, and Wheeling soils. Lakin soils have better natural drainage then all of the associated soils. Lakin soils are sandy; Cotaco and Wheeling soils are fine-loamy, and Vandalia soils are clayey.

Typical pedon of Lakin loamy sand, 3 to 15 percent slopes, in a field about 100 yards east of Lower Green Bottom Church, about 20 yards north of the cemetery:

Ap—0 to 5 inches; brown (10YR 4/3) loamy sand; weak fine and medium granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

E—5 to 10 inches; yellowish brown (10YR 5/4) loamy sand; weak fine and medium granular structure; very friable; many fine and medium roots; strongly acid; clear wavy boundary.

E&Bt1—10 to 20 inches; yellowish brown (10YR 5/6) loamy fine sand; single grained; loose (E part); strong brown (7.5YR 5/6) loamy fine sand discontinuous lamellae; weak fine and medium granular structure; very friable; clay binding sand grains (Bt1 part); many fine and medium roots; strongly acid; clear wavy boundary.

E&Bt2—20 to 50 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose (E part); strong brown (7.5YR 5/6) loamy fine sand discontinuous lamellae; weak fine and medium granular structure; very friable; clay binding sand grains (Bt2 part); common fine roots; medium acid; clear wavy boundary.

C—50 to 65 inches; yellowish brown (10YR 5/4) loamy sand; single grained; loose; medium acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Some pedons contain up to 3 percent gravel in the solum. In unlimed areas the soil is medium acid to very strongly acid.

The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4.

The E horizon is 10YR or 7.5YR, value of 5 or 6, and chroma of 4 through 6. It is loamy fine sand, loamy sand, or fine sand.

The E part of the E&Bt horizon has hue of 10YR or 7.5YR and value and chroma of 4 through 6. It is loamy fine sand, loamy sand, or fine sand. The Bt part has hue of 10YR through 5YR, value of 3 through 5, and chroma of 4 through 6. It is mostly loamy fine sand, loamy sand, or fine sand, but some pedons are sandy loam or fine sandy loam. The combined thickness of the lamellae in the control section does not exceed 5.5 inches.

The C horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is loamy fine sand or sand.

Lily Series

The Lily series consists of moderately deep, well drained soils formed in acid material weathered from sandstone. Lily soils are on upland ridges and knobs. Slope ranges from 15 to 35 percent.

Lily soils are on the landscape with Coolville, Gilpin, and Upshur soils. Lily soils have better natural drainage than Coolville soils. Lily soils are fine-loamy; Coolville and Upshur soils are clayey. Lily soils have more sand in the subsoil than Gilpin soils.

Typical pedon of Lily sandy loam, 15 to 25 percent slopes, in a recent road cut along West Virginia Route 6/2, about 800 yards north of West Virginia Route 6:

Oi—2 inches to 0; slightly decomposed leaf litter.

Ap—0 to 6 inches; brown (10YR 5/3) sandy loam; weak fine and medium granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

E—6 to 10 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

BE—10 to 14 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; very friable; common fine and medium roots; very strongly acid; clear wavy boundary.

Bt1—14 to 24 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; many distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—24 to 30 inches; strong brown (7.5YR 5/8) loam; weak medium and coarse subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

C—30 to 38 inches; yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) sandy loam; massive; very strongly acid; abrupt wavy boundary.

R—38 inches; sandstone.

The solum thickness and the depth to bedrock range from 20 to 40 inches. Rock fragments of sandstone make up 0 to 10 percent of the solum and 0 to 35 percent of the C horizon. In unlimed areas the soils are strongly acid to extremely acid.

The Ap and E horizons have hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 or 4.

The BE horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 5 through 8. It is loam or sandy loam.

The Bt horizon has hue of 10YR through 5YR, value of 4 or 5, and chroma of 5 through 8. It is loam or clay loam.

The C horizon has hue of 10YR through 5YR, value of 5 or 6, and chroma of 4 through 8. It is sandy loam, loamy sand, fine sandy loam, or loam.

Lindside Series

The Lindside series consists of very deep, moderately well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Lindside soils are on flood plains along the Ohio River. Slope ranges from 0 to 3 percent.

Lindside soils are on the landscape with Ashton, Chagrin, Huntington, and Melvin soils. Lindside soils have poorer natural drainage than Ashton, Chagrin, or Huntington soils. They have better natural drainage than Melvin soils. Lindside soils are fine-silty; Chagrin soils are fine-loamy. Lindside soils are flooded more frequently than Ashton soils.

Typical pedon of Lindside silt loam, in a meadow about 300 yards west of West Virginia Route 2, about 1,000 yards north of Fraziers Lane:

Ap—0 to 11 inches; dark brown (10YR 3/3) silt loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to moderate medium granular; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

BA—11 to 16 inches; brown (7.5YR 5/4) silt loam; weak medium and coarse subangular blocky structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

Bw—16 to 26 inches; brown (7.5YR 5/4) silty clay loam; common medium pinkish gray (7.5YR 6/2) mottles; weak medium subangular blocky structure; friable;

common fine roots; medium acid; clear wavy boundary.

BC—26 to 35 inches; brown (7.5YR 5/4) silty clay loam; many medium light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable few fine roots; medium acid; clear wavy boundary.

C—35 to 65 inches; brown (7/5YR 5/4) stratified silt loam and silty clay loam; many medium and coarse light brownish gray (10YR 6/2) mottles; massive; friable to firm; medium acid.

The solum thickness ranges from 25 to 50 inches, and the depth to bedrock is more than 60 inches. Some pedons contain up to 5 percent rock fragments in individual subhorizons. In unlimed areas the soils are strongly acid or medium acid in the upper part of the solum and medium acid or slightly acid in the lower part of the solum and in the C horizon.

The Ap horizon has hue of 10YR or 7.5YR, value mainly of 3 or 4, and chroma of 2 or 3. The dry value is 6 or more.

The BA, Bw, and BC horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. They are silt loam or silty clay loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 2 through 4. It is silt loam or silty clay loam.

Lobdell Series

The Lobdell series consists of very deep, moderately well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Lobdell soils are on flood plains mainly in the central and southern parts of the county. Slope ranges from 0 to 3 percent.

Lobdell soils are on the landscape with Chagrin, Dormont, Pope, and Sensabaugh soils. Lobdell soils have poorer natural drainage than Chagrin, Pope, or Sensabaugh soils. Lobdell soils are subject to flooding, which is not a characteristic of Dormont soils. Lobdell soils are fine-loamy; Pope soils are coarse-loamy.

Typical pedon of Lobdell silt loam, in a field about 800 yards south of the junction of West Virginia Route 21 and West Virginia Route 1, about 10 yards west of Edmonds Branch, near Howells Mill:

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; neutral; clear smooth boundary.

Bw1—5 to 16 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

Bw2—16 to 25 inches; dark yellowish brown (10YR 4/4) loam; common fine and medium light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; very friable; common fine roots; medium acid; clear wavy boundary.

BC—25 to 35 inches; yellowish brown (10YR 5/4) loam; common medium light brownish gray (10YR 6/2) and dark yellowish brown (10YR 4/6) mottles; weak coarse subangular blocky structure; very friable; common fine roots; slightly acid; clear wavy boundary.

C—35 to 65 inches; brown (10YR 5/3) stratified loam, silt loam, and sandy loam; common medium light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; massive; few fine roots; slightly acid.

The solum thickness ranges from 24 to 40 inches, and the depth to bedrock is more than 60 inches. Rock fragments make up 0 to 5 percent of A horizon and 0 to 15 percent of the B, BC, and C horizons. Reaction ranges from strongly acid to neutral in the A and B horizons and from medium acid to neutral in the C horizon.

The Ap horizon has hue of 10YR, value mainly of 2 through 4, and chroma of 1 through 3. Dry value is 6 or more.

The Bw and BC horizons have hue of 2.5Y through 7.5YR, value of 4 or 5, and chroma of 3 or 4. They are silt loam, silty clay loam, or loam.

The C horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 through 8. It is silt loam, loam, or sandy loam and is commonly stratified.

Markland Series

The Markland series consists of very deep, moderately well drained soils in slackwater alluvial material washed from limy and acid soils on uplands. The Markland soils are on low stream terraces along the Mud River and the Guyandotte River in the western part of Teays Valley and along the Guyan Creek in the northern part of the county. Slope ranges from 3 to 15 percent.

Markland soils are on the landscape with Cotaco, Guyan, and Kanawha soils. Markland soils are clayey; all the associated soils are fine-loamy. Markland soils have better natural drainage than Guyan soils and poorer natural drainage than Kanawha soils.

Typical pedon of Markland silt loam, 8 to 15 percent slopes, in a pasture about 70 yards north of U.S. Route 60, about 130 yards northwest of the Ona exit junction of I-64 and U.S. Route 60:

Ap—0 to 6 inches; brown (10YR 5/3) silt loam; weak fine and medium subangular blocky structure parting to moderate fine and medium granular; friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

Bt1—6 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and medium subangular blocky structure; friable; many fine and medium roots; many distinct clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—16 to 26 inches; yellowish brown (10YR 5/4) silty clay; many medium light brownish gray (10YR 6/2) coatings and mottles; moderate fine and medium angular blocky structure; firm; common fine and medium roots; many prominent clay films on faces of peds and in root pores; slightly acid; gradual wavy boundary.

Bt3—26 to 34 inches; yellowish brown (10YR 5/4) silty clay; many medium light brownish gray (10YR 6/2) and common fine gray (N 6/0) coatings and mottles; weak medium and coarse angular blocky structure; firm; few fine roots; many prominent clay films on faces of peds; moderately alkaline; gradual wavy boundary.

C—34 to 65 inches, yellowish brown (10YR 5/4) silty clay; common fine and medium gray (N 6/0) mottles and light brownish gray (10YR 6/2) silt coatings; massive; firm; moderately alkaline.

The solum thickness ranges from 20 to 40 inches, and the depth to bedrock is more than 60 inches. In unlimed areas the soil is neutral to strongly acid in the Ap horizon, slightly acid to strongly acid in the Bt horizon, and mildly alkaline or moderately alkaline in the BC and C horizons.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4.

The Bt horizon has hue of 2.5Y through 7.5YR, value of 4 or 5, and chroma of 3 or 4. It mainly is silty clay or clay, but in the upper part of most pedons it is silty clay loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 6. It mainly is clay or silty clay loam, and is stratified in some pedons with thin layers of fine sand or silt.

Melvin Series

The Melvin series consists of very deep, poorly drained soils formed in alluvial material washed from limy and acid soils on uplands. The Melvin soils are on flood plains along the Ohio River. Slope ranges from 0 to 3 percent.

Melvin soils are on the landscape with Ashton, Chagrin, Huntington, and Lindside soils. Melvin soils have poorer natural drainage than all of those soils. They are flooded more frequently than Ashton soils. Melvin soils are fine-silty; Chagrin soils are fine-loamy.

Typical pedon of Melvin silt loam, in a meadow about 40 yards north of West Virginia Route 2, about 900 yards west of the Mason County line:

Ap—0 to 9 inches; dark brown (10YR 4/3) silt loam; many fine strong brown (7.5YR 5/8) and dark grayish brown (10YR 4/2) mottles; weak medium granular and subangular blocky structure; very friable; many fine and medium roots; medium acid; clear smooth boundary.

Bg—9 to 27 inches; dark grayish brown (10YR 4/2) silt loam; common fine strong brown (7.5YR 5/8) mottles; weak medium and coarse subangular blocky structure; friable; common fine roots; slightly acid; gradual wavy boundary.

Cg—27 to 65 inches; gray (N 6/0) and grayish brown (10YR 5/2) silty clay loam; many medium and coarse strong brown (7.5YR 5/8) mottles; massive; friable; neutral.

The solum thickness ranges from 20 to 40 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the upper part of the solum is medium acid to neutral and the lower part of the solum and all of the C horizon are slightly acid or neutral.

The Ap horizon has hue of 10YR, value of 4 through 6, and chroma of 2 or 3.

The B horizon is neutral or has hue of 10YR, value of 4 through 7, and chroma of 0 through 2. It is silty clay loam or silt loam. Mottles are brown and red.

The C horizon is netural or has hue of 10YR, value of 4 through 6, and chroma of 0 through 2. It mainly is silty clay loam or silt loam. Some pedons are stratified with silty clay and fine sandy loam at a depth of more than 40 inches.

Monongahela Series

The Monongahela series consists of very deep, moderately well drained soils formed in alluvial material washed from acid soils on uplands. The Monongahela soils are on high stream terraces mainly in the Teays Valley. Slope ranges from 3 to 15 percent.

Monongahela soils are on the landscape with Allegheny, Gilpin, and Upshur soils. Monongahela soils have poorer natural drainage than all of those soils. Monongahela soils have a fragipan, which is not a characteristic of any of those soils. Monongahela soils are fine-loamy; Upshur soils are clayey.

Typical pedon of Monongahela loam, 3 to 8 percent slopes, about 150 yards north of Interstate 64, about 1,200 yards east of West Virginia County Route 60/84:

Ap—0 to 6 inches; brown (10YR 5/3) loam; weak medium subangular blocky structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

Bt1—6 to 17 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure;

friable; common fine and medium roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—17 to 23 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

Bx1—23 to 33 inches; brownish yellow (10YR 6/6) loam; many medium light gray (10YR 7/2) mottles; weak coarse and very coarse prismatic structure parting to weak medium and coarse subangular blocky; firm and brittle; few fine roots; few distinct clay films on faces of peds; common black concretions; very strongly acid; gradual wavy boundary.

Bx2—33 to 56 inches; light yellowish brown (10YR 6/4) loam; many coarse light gray (10YR 7/2) mottles and common fine strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure; very firm and brittle; few distinct clay films on faces of peds; many black concretions; very strongly acid; gradual wavy boundary.

C—56 to 65 inches; brownish yellow (10YR 6/6) loam; common fine and medium light gray (10YR 7/2) mottles; massive; friable; very strongly acid.

The solum thickness ranges from 40 to 72 inches. The depth to bedrock is more than 60 inches. Some pedons contain up to 10 percent rock fragments in individual subhorizons. In unlimed areas the soil is strongly acid or very strongly acid.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. It is silt loam, loam, or clay loam.

The Bx horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 through 8. It is silt loam, loam, or clay loam.

The C horizon has hue of 10YR or 7.5YR, value of 5 through 7, and chroma of 2 through 8. It is generally silt loam, loam, or clay loam but has pockets of sandy loam.

Pope Series

The Pope series consists of very deep, well drained soils formed in alluvial material washed from acid soils on uplands. The Pope soils are on flood plains along the Mud River. Slope ranges from 0 to 3 percent.

Pope soils are on the landscape with Chagrin, Lobdell, and Sensabaugh soils. Pope soils are coarse-loamy; all the associated soils are fine-loamy. Pope soils have better natural drainage than Lobdell soils.

Typical pedon of Pope fine sandy loam, in a field about 900 yards north of Ona Junior High School, about 60 yards south of the Mud River:

Ap—0 to 8 inches; dark yellowish brown (10YR 3/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

Bw1—8 to 25 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; very strongly acid; gradual smooth boundary.

Bw2—25 to 46 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; very friable; few fine roots; strongly acid; clear wavy boundary.

C—46 to 65 inches; yellowish brown (10YR 5/6) sandy loam; massive; very friable; few fine roots; very strongly acid.

The solum thickness ranges from 30 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 5 percent in individual subhorizons. In unlimed areas the soil is strongly acid to extremely acid.

The Ap horizon has hue of 10YR, value mainly of 3 through 5, and chroma of 2 through 4. The dry value is 6 or more.

The Bw horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It is loam, sandy loam, or fine sandy loam.

The C horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 3 through 6. It is sandy loam, loam, or loamy sand.

Sensabaugh Series

The Sensabaugh series consists of very deep, well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Sensabaugh soils are on narrow flood plains along small streams and are on alluvial fans. Slope ranges from 0 to 8 percent.

Sensabaugh soils are on the landscape with Chagrin, Dormont, Lobdell, Pope, and Vandalia soils. Sensabaugh soils have more gravel in the subsoil than Chagrin soils. They are subject to flooding, which is not a characteristic of Dormont or Vandalia soils. Sensabaugh soils have better natural drainage than Lobdell soils. Sensabaugh soils are fine-loamy, Pope soils are coarse-loamy, and Vandalia soils are clayey.

Typical pedon of Sensabaugh loam, 0 to 3 percent slopes, occasionally flooded, in a field about 600 yards north of the confluence of the Left Fork and Right Fork of Mill Creek, about 900 yards west of West Virginia Route 13:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) loam; weak fine and medium granular structure; very friable; many fine and medium roots; 10 percent rock fragments; medium acid; abrupt smooth boundary.

Bw—6 to 20 inches; dark brown (7.5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; many fine and medium roots; 15 percent rock fragments; medium acid; clear wavy boundary.

BC—20 to 30 inches; dark brown (7.5YR 4/4) gravelly fine sandy loam; weak fine and medium subangular blocky structure; friable; common fine roots; 20 percent rock fragments; medium acid; clear wavy boundary.

C—30 to 65 inches; dark brown (7.5YR 4/4) very gravelly fine sandy loam; massive; friable; 50 percent rock fragments; medium acid.

The solum thickness ranges from 24 to 40 inches, and the depth to bedrock is more than 60 inches. Rock fragments of gravel range make up 0 to 15 percent of the A horizon, 15 to 30 percent of the B horizon, and 20 to 60 percent of the C horizon. Gray, brown, or yellow mottles are in some pedons below a depth of 24 inches. In unlimed areas the soil is medium acid to mildly alkaline.

The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 through 4.

The Bw, BC, and C horizons have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 through 6. In the fine-earth fraction they are loam, clay loam, fine sandy loam, or silt loam.

Udorthents

Udorthents consist of a mixture of shallow to very deep soil and rock fragments that have been drastically disturbed by man. They are along highways, railroads, construction sites, and other urban development areas that have been excavated or filled. Slope ranges from 3 percent to nearly vertical cuts.

A typical pedon for Udorthents is not given because of the variability of the soils. The depth to bedrock is generally more than 40 inches and is more than 30 feet in some fill areas. The rock fragments have a wide range in kind, size, and amount. In unlimed areas the soils are extremely acid to moderately alkaline.

The A horizon has hue of 2.5YR through 2.5Y, value of 1 through 4, and chroma of 4 through 6. In the fine-earth fraction it is sandy loam, loam, silt loam, clay loam, silty clay loam, or silty clay.

The C horizon has hue of 2.5YR through 5Y, value of 3 through 7, and chroma of 1 through 8. Low-chroma mottles are lithochromic. In the fine-earth fraction it is sandy loam, loam, silt loam, clay loam, silty clay loam, or clay.

Upshur Series

The Upshur series consists of deep, well drained soils formed in limy material weathered mainly from clay shale. The Upshur soils are on ridgetops, benches, and side slopes in the northern and central parts of the county. Slope ranges from 8 to 65 percent.

Upshur soils are on the landscape with Allegheny, Coolville, Dormont, Gilpin, Lily, Monongahela, and Vandalia soils. Upshur soils are clayey; Allegheny, Dormont, Gilpin, Lily, and Monongahela soils are fine-loamy. Upshur soils have better natural drainage than Coolville, Dormont, or Monongahela soils. Upshur soils do not have a fragipan, which is characteristic of the Monongahela soils, and they have fewer rock fragments in the subsoil than Vandalia soils.

Typical pedon of Upshur silty clay loam, in an area of Gilpin-Upshur complex, 15 to 25 percent slopes, about 350 yards east of the junction of West Virginia Routes 29 and 34:

Ap—0 to 5 inches; dark brown (7.5YR 4/4) silty clay loam; moderate medium granular structure; very friable; many fine and medium roots; 5 percent rock fragments; very strongly acid; clear smooth boundary.

Bt1—5 to 13 inches; reddish brown (5YR 4/4) silty clay; weak medium subangular blocky structure; friable, plastic, sticky; common fine and medium roots; common distinct clay films on faces of peds; 5 percent rock fragments; slightly acid; clear wavy boundary.

Bt2—13 to 22 inches; reddish brown (2.5YR 4/4) clay; moderate medium subangular blocky structure; firm, very plastic, very sticky; common fine and medium roots; many prominent clay films on faces of peds; 10 percent rock fragments; slightly acid; clear wavy boundary.

Bt3—22 to 29 inches; weak red (10R 4/4) clay; moderate medium angular blocky structure; firm, very plastic, very sticky; common fine roots; many prominent clay films on faces of peds; 10 percent rock fragments; slightly acid; clear wavy boundary.

Bt4—29 to 38 inches; reddish brown (2.5YR 4/4) channery clay; weak medium subangular blocky structure; firm, very plastic, very sticky; few fine roots; common distinct clay films on faces of peds; 20 percent rock fragments; slightly acid clear wavy boundary.

C—38 to 43 inches; reddish brown (2.5YR 4/4) channery clay; massive; firm; few roots; 30 percent rock fragments; moderately alkaline; clear smooth boundary.

Cr—43 inches; weathered olive shale.

The solum thickness ranges from 26 to 42 inches, and the depth to bedrock is 40 to 60 inches. Rock fragments of shale make up 0 to 25 percent of the solum and 25 to 70 percent of the C horizon. In unlimed areas the soil is very strongly acid to slightly acid in the A and Bt horizons and strongly acid to moderately alkaline in the C horizon.

The A horizon has hue of 5YR through 10YR, and value and chroma of 3 or 4. In the fine-earth texture it is silty clay loam or silty clay.

The Bt and BC horizons have hue of 10R through 5YR, value of 3 or 4, and chroma of 4 or 6. In the fine-earth fraction the upper part of the Bt horizon is silty clay loam, silty clay, or clay. The fine-earth texture of the lower part of the Bt horizon is silty clay or clay.

The C horizon has hue of 10R through 5YR, value of 3 or 4, and chroma of 4 through 6. In the fine-earth fraction it is silty clay loam, silty clay, or clay.

Vandalia Series

The Vandalia series consists of very deep, well drained soils formed in limy and acid colluvial material that moved downslope mainly from Gilpin and Upshur soils on uplands. The Vandalia soils are on foot slopes along the base of steeper slopes and around the heads of drainageways in the northern and central parts of the county. Slope ranges from 8 to 25 percent.

Vandalia soils are on the landscape with Dormont, Gilpin, Lakin, Sensabaugh, and Upshur soils. Vandalia soils are clayey; Dormont, Gilpin, and Sensabaugh soils are fine-loamy, and Lakin soils are sandy. Vandalia soils have poorer natural drainage than Lakin soils. Vandalia soils have more rock fragments in the subsoil than Upshur soils. Vandalia soils are not subject to flooding, which is a characteristic of Sensabaugh soils.

Typical pedon of Vandalia silt loam, 15 to 25 percent slopes, in a wooded area about 1,200 yards northeast of the confluence of the Mud River and the Little Cabell Creek:

Oi—2 inches to 0; hardwood and conifer litter.

Ap—0 to 7 inches; dark brown (10YR 3/3) silt loam, light yellowish brown (10YR 6/4) dry; moderate fine and medium granular structure; very friable; many medium and coarse roots; 5 percent rock fragments; strongly acid; abrupt wavy boundary.

BA—7 to 14 inches; brown (7.5YR 5/4) gravelly silty clay loam; weak medium subangular blocky structure; friable; many fine medium and coarse roots; 20 percent rock fragments; medium acid; clear wavy boundary.

Bt1—14 to 31 inches; reddish brown (5YR 4/4) gravelly silty clay loam; weak fine and medium roots; common distinct clay films on faces of peds; 25 percent rock fragments; medium acid; clear wavy boundary.

Bt2—31 to 41 inches; reddish brown (5YR 4/4) very gravelly silty clay loam; weak medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 40 percent rock fragments; medium acid; clear wavy boundary.

C—41 to 65 inches; reddish brown (5YR 4/4) gravelly silty clay loam; massive; friable; few fine roots in upper part; 25 percent rock fragments; medium acid.

The solum thickness ranges from 40 to 60 inches, and the depth to bedrock is more than 60 inches. Rock fragments of shale, siltstone, and sandstone make up from 5 to 15 percent of the A horizon and 5 to 40 percent of the B and C horizons. In unlimed areas the soil ranges from medium acid to very strongly acid in the solum and from strongly acid to slightly acid in the C horizon.

The Ap horizon has hue of 5YR through 10YR, value mainly of 3 or 4, and chroma of 2 through 4. The dry value is 6 or more.

The BA horizon and upper part of the Bt horizon have hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. They are silty clay loam in the fine-earth fraction. The lower part of the Bt horizon and the BC horizon have hue of 2.5YR of 5YR, value of 3 or 4, and chroma of 3 through 6. In the fine-earth fraction the lower part of the Bt horizon and the BC horizon are silty clay loam or silty clay.

The C horizon has hue of 2.5YR through 5YR, value of 4 or 5, and chroma of 3 through 6. In the fine-earth fraction it is silty clay loam, silty clay, or clay.

Wheeling Series

The Wheeling series consists of very deep, well drained soils formed in alluvial material washed from limy and acid soils on uplands. The Wheeling soils are on low stream terraces along the Ohio River. Slope ranges from 0 to 6 percent.

Wheeling soils are on the landscape with Ashton, Cotaco, and Lakin soils. Wheeling soils are fine-loamy; Ashton soils are fine-silty, and Lakin soils are sandy. Wheeling soils have better natural drainage than Cotaco soils and poorer natural drainage than Lakin soils. Wheeling soils are not flooded; Ashton soils are subject to rare flooding.

Typical pedon of Wheeling loam, 0 to 6 percent slopes, in a hayfield about 170 yards west of West Virginia Route 2, about 1,700 yards south of Lunsford Lane, in Green Bottom:

Ap—0 to 9 inches; dark brown (10YR 3/3) loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to moderate fine and medium granular; very friable; many fine and medium roots; neutral; abrupt smooth boundary.

Bt—9 to 27 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common fine roots; common distinct clay films on faces of peds; medium acid; clear wavy boundary.

BC1—27 to 31 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; medium acid; clear wavy boundary.

BC2—31 to 43 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; friable; few fine roots; strongly acid; 10 percent gravel; gradual wavy boundary.

C—43 to 65 inches; dark yellowish brown (10YR 4/6) stratified sandy loam and loamy sand; massive; very friable; medium acid.

The solum thickness ranges from 40 to 50 inches, and the depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 25 percent in individual subhorizons. In unlimed areas the soil is medium acid or strongly acid.

The Ap horizon has hue of 10YR, value mainly of 3 through 5, and chroma of 2 or 3. The dry value is 6 or more.

The Bt horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 through 6. In the fine-earth fraction it is loam or clay loam.

The BC horizon has the same colors as the Bt horizon. In the fine-earth fraction the BC horizon is fine sandy loam or sandy loam.

The C horizon has hue of 10YR or 7.5YR and value and chroma of 4 through 6. It is stratified and ranges from very fine sand to gravel.

Formation of the Soils

The origin and development of the soils in Cabell County are described in this section. The five factors of soil formation are listed, and their influence on the soils is described. Also described are the morphology of soils as related to horizon nomenclature, the processes involved in horizon development, and the geologic characteristics of the area.

Factors of Soil Formation

Ths soils in Cabell County have resulted from the interaction of five major factors of soil formation: parent material, time, climate, living organisms, and topography (*3*). Each factor modifies the others. Parent material, topography, and time have produced the major differences among the soils in the survey area. Climate and living organisms generally show their influence throughout broad areas, and their effects are relatively uniform throughout the area.

Parent Material, Time, and Climate

The character of the parent material strongly influences the time required for soil formation and the nature of the soil produced. The soils of the county formed in residual, colluvial, and alluvial parent materials. Most soils formed in residual material weathered from interbedded shale, siltstone, and sandstone. For example, Gilpin soils formed in interbedded shale, siltstone, and sandstone; Lily soils formed in sandstone; and Upshur soils formed in clay shale.

The residual material is the oldest parent material in the county. Formation from this material, however, has been retarded by clayey material, resistant rock, slope, and continual soil erosion. Consequently, some of the soils formed from residual material have a less developed profile than some of the soils formed in younger material.

Colluvial material is along foot slopes and at the head of drainageways. This material moved downslope from the acid and limy residual soils. The Vandalia soils formed in colluvium downslope from the soils of the Gilpin-Upshur complex. The Dormont soils formed in colluvium downslope from Gilpin and Upshur soils.

The alluvial material on terraces and flood plains has washed from acid and limy soils on uplands. The soil-forming processes have had considerable time to act on the material on the terraces. Many additions, losses, and alterations have taken place. The resulting soils, such as Allegheny and Monongahela soils, are strongly leached and have a moderately well developed profile. The alluvial deposits on the flood plains are the youngest parent material in the county. Most of this material is physically well suited to soil formation, but the soil-forming processes have had little time to operate. The soils on flood plains usually exhibit a weakly developed profile. Chagrin, Lobdell, and Sensabaugh are examples of soils on flood plains.

The climate is generally relatively uniform throughout the county and is not responsible for any major differences in the soil, but it causes the development of horizons in the soil profile. A detailed description of climate is given in the section "General Nature of the County."

Living Organisms

All living organisms, mainly vegetation, animals, bacteria, and fungi, affect soil formation. The kind and amount of vegetation is generally responsible for the amount of organic matter, the color of the surface layer, and, in part, the amount of nutrients in the soil. Earthworms and burrowing animals help keep the soil open and porous, and they mix organic matter and mineral matter by moving the soil to the surface. Bacteria and fungi decompose organic matter, and some have a major influence on the weathering and decomposition of minerals, which causes a release of nutrients for plant food.

Topography

Topography affects soil formation by its effect on the amount of water moving through the soil, the amount and rate of runoff, and the rate of erosion.

Gently sloping and strongly sloping soils have had large amounts of water move through them. This water may percolate freely through the soil, as in the Gilpin soil, or the water movement may be restricted, as in the Coolville and Upshur soils on uplands and the Monongahela and Markland soils on terraces. On the steep and very steep hillsides, less water moves through the soil and the amount and rate of runoff are greater. The soil material is washed away almost as rapidly as it forms. Most of the soils on the steeper hillsides are less deep to bedrock than the soils on the more gentle slopes.

The topography of Cabell County is favorable for formation of soils on flood plains and terraces, and formation is progressing at a rapid rate. Soils on flood plains are weakly developed, however, mainly because too little time has elapsed since the parent material was deposited.

Morphology of Soils

The results of the soil-forming processes can be observed in the different layers, or soil horizons, in the soil profile. The profile extends from the soil surface downward to materials that are little changed by the soil-forming processes. Most soils contain three major horizons, called the A, B, and C horizons. These horizons can be further subdivided by the use of numbers and letters to indicate changes within the major horizon.

The A horizon is the surface layer. It is the layer that has the maximum accumulation of organic matter.

The E horizon is a subsurface layer. It is the layer of maximum leaching of clay, iron, or aluminum or some combination of these. It is usually, but not necessarily, lighter in color than the A horizon.

The B horizon underlies the A horizon or the A and the E horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. The B horizon commonly has blocky structure and is generally more firm and lighter in color than the A horizon.

The C horizon is below the A and B horizons. It consists of material that has been modified by weathering but is altered little by the soil forming processes.

Many processes are involved in the formation of soil horizons in Cabell County. The more important of these are the accumulation of organic matter, the reduction and transfer of iron, the formation and translocation of clay minerals, and the formation of structure. Such processes are continually taking place and have been for thousands of years.

Most of the well drained and moderately well drained soils on uplands have a yellowish brown, strong brown, or dark red B horizon. These colors are caused mainly by iron oxides. The B horizon of these soils has a blocky structure, and contains translocated clay minerals.

A fragipan has formed in the B horizon of moderately well drained Monongahela soils on high terraces. This layer is dense and brittle, is mottled, and has moderately slow or slow permeability to water and air. Most fragipans are grayish or mottled with gray. The gray in moderately well drained, somewhat poorly drained, and poorly drained soils is the result of the reduction of iron during soil formation.

Geology

Gordon B. Bayles, geologist, Soil Conservation Service, assisted with the preparation of this section.

Most of the exposed rock in the county is part of the Monongahela and Conemaugh groups. The younger Dunkard rocks are exposed on some ridgetops in the northern part of the county. The exposed rock consists mainly of interbedded limy red and olive gray shale, acid gray and brown siltstone, sandstone, coal, and limestone (*9*).

The dominate rock types of the Dunkard and Monongahela groups are limy red and olive gray shale, siltstone, and sandstone. The Pittsburgh coal, the basal unit of the Monogahela group, is sparse in the southwest part of the county near the ridgetop. Acid sandstone, siltstone, olive gray shale, and a few thin red shale beds dominate the Conemaugh group; however, a few thin beds of shaly limestone are common in some areas.

The soils on the ridgetops in the northern part of the county formed in material weathered mainly from younger Dunkard and Monongahela rocks, and the soils on the side slopes in the northern and central parts of the county formed from the weathering of older Monongahela rocks. The soils in the southern part of the county formed mainly in material weathered from rocks of the Conemaugh group.

The soils in the Teays Valley from Culloden to Huntington formed from lacustrine sediments of the Pleistocene Teays Lake. The Mud River and the Guyandotte River have eroded and cut through the lacustrine sediments and bedrock of the Teays Valley from Milton to Huntington. The soils on flood plains and terraces adjacent to these rivers formed in young alluvial sediments from the drainage areas of the Mud River and the Guyandotte River. The soils along the Ohio River have formed in alluvial sediments from the Ohio River drainage area.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 2.4
Low	2.4 to 3.2
Moderate	3.2 to 5.2
High	more than 5.2

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial melt water. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Limy. Soil material containing sufficient amounts of calcium or magnesium carbonate to have a base saturation of more than 35 percent.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial melt water.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material).

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperture below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Much has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05

millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multipled by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity are—

	SAR
Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifiying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by melt water streams, in glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Data recorded in the period 1961-80 at Huntington, West Virginia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	39.9	22.8	31.4	71	-7	67	3.04	1.77	4.17	7	9.8
February---	43.4	25.0	34.2	76	-2	73	2.60	1.28	3.74	6	6.6
March------	56.2	35.3	45.8	83	12	245	4.07	2.30	5.63	9	4.0
April------	66.8	43.8	55.3	87	24	459	3.55	1.88	5.00	7	.1
May--------	75.3	52.3	63.8	90	32	738	3.88	2.03	5.49	8	.0
June-------	82.0	60.1	71.1	94	43	933	3.53	1.59	5.18	7	.0
July-------	84.8	64.7	74.8	96	49	1,079	4.73	2.84	6.42	9	.0
August-----	83.6	63.8	73.7	95	49	1,045	3.92	1.94	5.63	6	.0
September--	77.8	57.3	67.6	93	38	828	3.03	1.60	4.28	6	.0
October----	67.0	44.7	55.9	85	24	493	2.64	1.51	3.71	5	.0
November---	55.1	36.6	45.9	79	15	204	2.98	1.79	4.04	7	1.5
December---	45.1	28.4	36.8	73	4	103	3.18	1.52	4.61	7	3.9
Yearly:											
Average--	64.8	44.6	54.7	---	---	---	---	---	---	---	---
Extreme--	---	---	---	97	-7	---	---	---	---	---	---
Total----	---	---	---	---	---	6,267	41.15	35.92	46.19	84	25.9

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1961-80 at Huntington, West Virginia]

Probability	Temperature		
	24^{o} F or lower	28^{o} F or lower	32^{o} F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	April 8	April 21	May 11
2 years in 10 later than--	April 2	April 16	May 6
5 years in 10 later than--	March 22	April 4	April 26
First freezing temperature in fall:			
1 year in 10 earlier than--	October 27	October 11	October 2
2 years in 10 earlier than--	November 2	October 18	October 8
5 years in 10 earlier than--	November 14	October 30	October 18

TABLE 3.--GROWING SEASON

[Data recorded in the period 1961-80 at Huntington, West Virginia]

Probability	Length of growing season if daily minimum temperature is--		
	Higher than 24^{o} F	Higher than 28^{o} F	Higher than 32^{o} F
	Days	Days	Days
9 years in 10	209	181	155
8 years in 10	219	190	162
5 years in 10	237	208	175
2 years in 10	256	226	188
1 year in 10	265	236	195

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AgC	Allegheny loam, bedrock substratum, 8 to 15 percent slopes	1,340	0.7
AhC	Allegheny, bedrock substratum-Urban land complex, 3 to 15 percent slopes	1,450	0.8
AsA	Ashton silt loam, 0 to 3 percent slopes	520	0.3
AsB	Ashton silt loam, 3 to 8 percent slopes	300	0.2
Ca	Chagrin silt loam, occasionally flooded	2,350	1.3
Cg	Chagrin loam, overwash, occasionally flooded	830	0.5
Cm	Chagrin-Melvin silt loams, frequently flooded	320	0.2
CoB	Coolville silt loam, 3 to 8 percent slopes	450	0.2
CtB	Cotaco silt loam, 3 to 8 percent slopes	550	0.3
DoD	Dormont silt loam, loamy substratum, 15 to 25 percent slopes	5,810	3.2
GlC	Gilpin silt loam, 8 to 15 percent slopes	230	0.1
GlD	Gilpin silt loam, 15 to 25 percent slopes	240	0.1
GlE	Gilpin silt loam, 25 to 35 percent slopes	1,820	1.0
GpF	Gilpin silt loam, 35 to 65 percent slopes, stony	23,520	12.9
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	2,720	1.5
GuC3	Gilpin-Upshur complex, 8 to 15 percent slopes, severely eroded	560	0.3
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	17,100	9.4
GuD3	Gilpin-Upshur complex, 15 to 25 percent slopes, severely eroded	1,970	1.1
GuE	Gilpin-Upshur complex, 25 to 35 percent slopes	24,620	13.5
GuE3	Gilpin-Upshur complex, 25 to 35 percent slopes, severely eroded	5,100	2.8
GuF	Gilpin-Upshur complex, 35 to 65 percent slopes	53,800	29.5
GxD	Gilpin-Upshur-Urban land complex, 15 to 25 percent slopes	1,090	0.6
Gy	Guyan silt loam	750	0.4
Gz	Guyan-Urban land complex	740	0.4
Hu	Huntington silt loam	410	0.2
KaA	Kanawha loam, 0 to 3 percent slopes, protected	550	0.3
KaB	Kanawha loam, 3 to 8 percent slopes, protected	550	0.3
KnA	Kanawha loam, 0 to 3 percent slopes, rarely flooded	260	0.1
KnB	Kanawha loam, 3 to 8 percent slopes, rarely flooded	740	0.4
KuB	Kanawha-Urban land complex, 0 to 8 percent slopes	410	0.2
LaC	Lakin loamy sand, 3 to 15 percent slopes	50	*
LlD	Lily sandy loam, 15 to 25 percent slopes	240	0.1
LlE	Lily sandy loam, 25 to 35 percent slopes	270	0.1
Lm	Lindside silt loam	290	0.2
Lo	Lobdell silt loam	1,180	0.7
MaB	Markland silt loam, 3 to 8 percent slopes	200	0.1
MaC	Markland silt loam, 8 to 15 percent slopes	710	0.4
Me	Melvin silt loam	310	0.2
MoB	Monongahela loam, 3 to 8 percent slopes	1,000	0.6
MoC	Monongahela loam, 8 to 15 percent slopes	260	0.1
MuC	Monongahela-Urban land complex, 3 to 15 percent slopes	430	0.2
Po	Pope fine sandy loam	400	0.2
SoA	Sensabaugh loam, 0 to 3 percent slopes, occasionally flooded	3,250	1.8
SrB	Sensabaugh loam, 3 to 8 percent slopes, rarely flooded	2,800	1.5
SvC	Sensabaugh-Vandalia-Urban land complex, 3 to 15 percent slopes	3,340	1.9
Ud	Udorthents, smoothed	3,850	2.1
UpC	Upshur silty clay loam, 8 to 15 percent slopes	290	0.2
Ur	Urban land	2,450	1.3
Us	Urban land-Ashton-Lindside complex	1,400	0.8
UwB	Urban land-Wheeling complex, 0 to 6 percent slopes	1,100	0.6
VaD	Vandalia silt loam, 15 to 25 percent slopes	2,450	1.3
VuD	Vandalia-Urban land complex, 8 to 25 percent slopes	470	0.3
WhB	Wheeling loam, 0 to 6 percent slopes	300	0.2
W	Water	4,260	2.3
	Total	182,400	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AsA	Ashton silt loam, 0 to 3 percent slopes
AsB	Ashton silt loam, 3 to 8 percent slopes
Ca	Chagrin silt loam, occasionally flooded
Cg	Chagrin loam, overwash, occasionally flooded
Hu	Huntington silt loam
KaA	Kanawha loam, 0 to 3 percent slopes, protected
KaB	Kanawha loam, 3 to 8 percent slopes, protected
KnA	Kanawha loam, 0 to 3 percent slopes, rarely flooded
KnB	Kanawha loam, 3 to 8 percent slopes, rarely flooded
Lm	Lindside silt loam
Lo	Lobdell silt loam
Po	Pope fine sandy loam
SoA	Sensabaugh loam, 0 to 3 percent slopes, occasionally flooded
SrB	Sensabaugh loam, 3 to 8 percent slopes, rarely flooded
WhB	Wheeling loam, 0 to 6 percent slopes

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky-bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
AgC------------- Allegheny	IIIe	105	70	40	3.5	4.0	4.5	2,750
AhC**----------- Allegheny-Urban land	---	---	---	---	---	---	---	---
AsA------------- Ashton	I	140	80	50	5.0	5.5	5.5	3,200
AsB------------- Ashton	IIe	130	80	45	5.0	5.5	5.5	3,000
Ca, Cg---------- Chagrin	IIw	125	75	45	4.5	5.0	5.5	---
Cm-------------- Chagrin-Melvin	Vw	---	---	---	---	---	4.5	---
CoB------------- Coolville	IIe	90	65	40	3.0	3.5	4.5	2,300
CtB------------- Cotaco	IIe	110	65	35	3.0	3.5	4.5	2,400
DoD------------- Dormont	IVe	80	55	35	2.5	3.0	4.0	---
GlC------------- Gilpin	IIIe	85	60	35	3.0	3.5	4.5	2,300
GlD------------- Gilpin	IVe	80	55	30	2.5	3.0	4.0	2,000
GlE------------- Gilpin	VIe	---	---	---	---	---	3.0	---
GpF------------- Gilpin	VIIs	---	---	---	---	---	---	---
GuC------------- Gilpin-Upshur	IIIe	90	60	35	3.0	3.5	4.5	2,300
GuC3------------ Gilpin-Upshur	IVe	85	55	30	2.5	3.0	4.0	---
GuD------------- Gilpin-Upshur	IVe	85	55	30	2.5	3.0	4.0	---
GuD3------------ Gilpin-Upshur	VIe	---	---	---	---	---	3.5	---
GuE------------- Gilpin-Upshur	VIe	---	---	---	---	---	3.5	---
GuE3------------ Gilpin-Upshur	VIIe	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky-bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
GuF------------- Gilpin-Upshur	VIIe	---	---	---	---	---	---	---
GxD**----------- Gilpin-Upshur-Urban land	---	---	---	---	---	---	---	---
Gy-------------- Guyan	IIIw	105	75	---	3.5	---	4.5	---
Gz**------------ Guyan-Urban land	---	---	---	---	---	---	---	---
Hu-------------- Huntington	IIw	130	80	50	3.5	5.0	5.5	3,200
KaA------------- Kanawha	I	135	80	50	3.5	5.0	5.5	3,000
KaB------------- Kanawha	IIe	130	80	50	3.5	5.0	5.5	3,000
KnA------------- Kanawha	I	135	80	50	3.5	5.0	5.5	3,000
KnB------------- Kanawha	IIe	130	80	50	3.5	5.0	5.5	3,000
KuB**----------- Kanawha-Urban land	---	---	---	---	---	---	---	---
LaC------------- Lakin	IVs	70	40	30	2.0	3.0	2.0	---
LlD------------- Lily	IVe	70	55	30	2.5	3.0	4.0	1,900
LlE------------- Lily	VIe	---	---	---	---	---	3.5	---
Lm-------------- Lindside	IIw	130	80	40	3.5	4.5	5.5	2,800
Lo-------------- Lobdell	IIw	125	80	40	3.5	4.5	5.5	2,400
MaB------------- Markland	IIe	80	60	35	2.5	3.0	4.0	---
MaC------------- Markland	IIIe	70	55	30	2.5	3.0	4.0	---
Me-------------- Melvin	IIIw	100	60	---	3.5	---	4.5	---
MoB------------- Monongahela	IIe	110	65	40	3.0	3.5	4.5	2,500

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Oats	Wheat	Grass-legume hay	Alfalfa hay	Kentucky-bluegrass	Tobacco
		Bu	Bu	Bu	Tons	Tons	AUM*	Lbs
MoC------------- Monongahela	IIIe	90	60	35	3.0	3.0	4.5	2,500
MuC**----------- Monongahela-Urban land	---	---	---	---	---	---	---	---
Po-------------- Pope	IIw	130	80	45	3.5	4.5	5.0	2,700
SoA------------- Sensabaugh	IIw	125	75	45	3.5	4.5	5.5	2,600
SrB------------- Sensabaugh	IIe	120	70	45	3.5	4.5	5.5	2,600
SvC**----------- Sensabaugh-Vandalia-Urban land	---	---	---	---	---	---	---	---
Ud. Udorthents	---	---	---	---	---	---	---	---
UpC------------- Upshur	IVe	90	60	35	3.0	4.0	4.5	2,400
Ur**------------ Urban land	---	---	---	---	---	---	---	---
Us-------------- Urban land-Ashton-Lindside	---	---	---	---	---	---	---	---
UwB------------- Urban land-Wheeling	---	---	---	---	---	---	---	---
VaD------------- Vandalia	IVe	90	55	30	2.5	4.0	4.0	---
VuD**----------- Vandalia-Urban land	---	---	---	---	---	---	---	---
WhB------------- Wheeling	IIe	125	75	45	3.5	4.5	5.5	3,100
W**. Water								

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	1,330	---	---	---	---
II	15,600	6,890	8,710	---	---
III	6,320	5,260	1,060	---	---
IV	26,740	26,690	---	50	---
V	320	---	320	---	---
VI	28,680	28,680	---	---	---
VII	82,420	58,900	---	23,520	---
VIII	---	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Average annual growth *		
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Cubic feet/ac	Board feet/ac	Cords/ac
AgC------------- Allegheny	4A	Slight	Slight	Slight	Moderate	Black oak-----------	79	61	243	0.80
						Shortleaf pine------	87	144	---	---
						Yellow poplar-------	100	107	580	1.23
						Virginia pine-------	72	112	---	---
						Sugar maple---------	---	---	---	---
						White ash-----------	---	---	---	---
						Northern red oak----	---	---	---	---
						Red maple-----------	---	---	---	---
						Pignut hickory------	---	---	---	---
						White oak-----------	78	60	236	0.78
						Black cherry--------	---	---	---	---
AsA, AsB-------- Ashton	5A	Slight	Slight	Slight	Severe	Pin oak-------------	94	76	348	1.00
						Sweetgum------------	87	98	---	---
						Hackberry-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						Red maple-----------	---	---	---	---
						White ash-----------	---	---	---	---
						American sycamore---	---	---	---	---
						White oak-----------	---	---	---	---
Ca, Cg---------- Chagrin	5A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	292	0.89
						Yellow poplar-------	96	100	524	1.15
						Sugar maple---------	86	53	---	---
						White oak-----------	---	---	---	---
						Black cherry--------	---	---	---	---
						White ash-----------	---	---	---	---
						Black walnut--------	---	---	---	---
Cm**:										
Chagrin--------	5A	Slight	Slight	Slight	Severe	Northern red oak----	86	68	292	0.89
						Yellow poplar-------	96	100	524	1.15
						Sugar maple---------	86	53	---	---
						White oak-----------	---	---	---	---
						Black cherry--------	---	---	---	---
						White ash-----------	---	---	---	---
						Black walnut--------	---	---	---	---
Melvin---------	5W	Slight	Slight	Slight	Severe	Pin oak-------------	95	77	355	1.02
						Eastern cottonwood--	95	---	---	---
						Sweetgum------------	87	98	---	---
						Green ash-----------	---	---	---	---
						Hackberry-----------	---	---	---	---
						Hickory-------------	---	---	---	---
						Red maple-----------	---	---	---	---
						American elm--------	---	---	---	---
CoB------------- Coolville	3A	Slight	Slight	Slight	Severe	Northern red oak----	66	48	152	0.61
						Yellow poplar-------	68	51	188	0.59
						White oak-----------	---	---	---	---
						Black cherry--------	---	---	---	---
						Black walnut--------	---	---	---	---
						Sugar maple---------	---	---	---	---
						White ash-----------	---	---	---	---

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth *: Cubic feet/ac	Average annual growth *: Board feet/ac	Average annual growth *: Cords/ac
CtB------------- Cotaco	5A	Slight	Slight	Slight	Severe	Black oak-----------	81	123	---	---
						Virginia pine-------	81	98	510	1.14
						Yellow poplar-------	95	69	299	0.91
						Sweet birch---------	---	---	---	---
						White oak-----------	83	65	271	0.85
						American beech------	---	---	---	---
						Black walnut--------	---	---	---	---
						Blackgum------------	---	---	---	---
						Scarlet oak---------	---	---	---	---
						American elm--------	---	---	---	---
DoD------------- Dormont	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	80	62	250	0.81
						Yellow poplar-------	80	71	320	0.83
						White ash-----------	80	50	---	---
						Sugar maple---------	80	50	---	---
GlC------------- Gilpin	4A	Slight	Slight	Slight	Moderate	Northern red oak----	72	54	194	0.70
						Yellow poplar-------	90	90	440	1.04
						Virginia pine-------	71	110	---	---
						White oak-----------	66	48	152	0.61
						Chestnut oak--------	67	49	159	0.63
						Scarlet oak---------	75	57	215	0.74
						Black oak-----------	71	53	187	0.68
GlD, GlE-------- Gilpin (North aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	79	61	243	0.80
						Yellow poplar-------	89	88	428	1.01
						Chestnut oak--------	65	48	145	0.60
						White oak-----------	67	49	177	0.57
						Black oak-----------	78	60	236	0.78
						Virginia pine-------	74	114	---	---
GlD, GlE-------- Gilpin (South aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	66	48	152	0.61
						Yellow poplar-------	90	90	440	1.04
						Black oak-----------	69	51	173	0.65
						Chestnut oak--------	69	51	173	0.65
						Scarlet oak---------	73	55	201	0.71
						White oak-----------	66	48	152	0.60
						Virginia pine-------	68	50	---	---
GpF------------- Gilpin (North aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	79	61	243	0.80
						Yellow poplar-------	89	88	428	1.01
						Chestnut oak--------	65	48	145	0.60
						White oak-----------	67	49	177	0.57
						Black oak-----------	78	60	236	0.78
						Virginia pine-------	74	114	---	---
GpF------------- Gilpin (South aspect)	3R	Severe	Severe	Moderate	Moderate	Northern red oak----	66	48	152	0.61
						Yellow poplar-------	90	90	440	1.04
						Black oak-----------	69	51	173	0.65
						Chestnut oak--------	69	51	173	0.65
						Scarlet oak---------	73	55	201	0.71
						White oak-----------	66	48	152	0.60
						Virginia pine-------	68	50	---	---

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Average annual growth *		
		Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Common trees	Site index	Cubic feet/ac	Board feet/ac	Cords/ac
GuC**, GuC3**:										
Gilpin----------	4A	Slight	Slight	Slight	Moderate	Northern red oak----	72	54	194	0.70
						Yellow poplar-------	90	90	440	1.04
						Virginia pine-------	71	110	---	---
						White oak-----------	66	48	152	0.61
						Chestnut oak--------	67	49	159	0.63
						Scarlet oak---------	75	57	215	0.74
						Black oak-----------	71	53	187	0.68
Upshur----------	3C	Severe	Severe	Slight	Severe	Northern red oak----	65	48	145	0.80
						Yellow poplar-------	80	71	320	0.83
						Eastern white pine--	80	147	---	---
						Virginia pine-------	66	102	---	---
GuD**, GuD3**:										
Gilpin---------- (North aspect)	4R	Moderate	Moderate	Slight	Moderate	Northern red oak----	79	61	243	0.80
						Yellow poplar-------	89	88	428	1.01
						Black oak-----------	78	60	236	0.78
						Chestnut oak--------	65	48	145	0.60
						White oak-----------	67	49	177	0.57
						Virginia pine-------	74	114	---	---
Upshur---------- (North aspect)	4R	Severe	Severe	Slight	Severe	Northern red oak----	74	56	208	0.73
						Yellow poplar-------	90	90	440	1.04
						Eastern white pine--	78	143	---	---
						Virginia pine-------	69	107	---	---
						Black oak-----------	74	56	208	0.73
						Chestnut oak--------	66	48	152	0.61
						Scarlet oak---------	71	53	187	0.68
						White oak-----------	69	51	173	0.65
GuD**, GuD3**:										
Gilpin---------- (South aspect)	3R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	66	48	152	0.61
						Yellow poplar-------	90	90	440	1.04
						Black oak-----------	69	51	173	0.65
						Chestnut oak--------	69	51	173	0.65
						Scarlet oak---------	73	55	201	0.71
						White oak-----------	66	48	152	0.60
						Virginia pine-------	68	50	---	---
Upshur---------- (South aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak----	60	43	110	0.52
						Eastern white pine--	84	153	---	---
						Virginia pine-------	63	96	---	---
						Black oak-----------	58	41	100	0.49
						Chestnut oak--------	54	38	80	0.44
						Scarlet oak---------	61	44	117	0.54
						White oak-----------	59	42	105	0.51
						Yellow poplar-------	93	95	482	1.10

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth *: Cubic feet/ac	Board feet/ac	Cords/ac
GuE**, GuE3**:										
Gilpin--------- (North aspect)	4R	Moderate	Moderate	Moderate	Moderate	Northern red oak----	79	61	243	0.80
						Yellow poplar-------	89	88	428	1.01
						Black oak-----------	78	60	236	0.78
						Chestnut oak--------	65	48	145	0.60
						White oak-----------	67	49	177	0.57
						Virginia pine-------	74	114	---	---
Upshur--------- (North aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	74	56	208	0.73
						Eastern white pine--	78	143	---	---
						Virginia pine-------	69	107	---	---
						Yellow poplar-------	90	90	440	1.04
						Black oak-----------	74	56	208	0.73
						Chestnut oak--------	66	48	152	0.61
						Scarlet oak---------	71	53	187	0.68
						White oak-----------	69	51	173	0.65
GuE**, GuE3**:										
Gilpin--------- (South aspect)	3R	Moderate	Moderate	Slight	Moderate	Northern red oak----	66	48	152	0.61
						Yellow poplar-------	90	90	440	1.04
						Black oak-----------	69	51	173	0.65
						Chestnut oak--------	69	51	173	0.65
						Scarlet oak---------	73	55	201	0.71
						White oak-----------	66	48	152	0.60
						Virginia pine-------	68	50	---	---
Upshur--------- (South aspect)	3R	Severe	Severe	Slight	Severe	Northern red oak----	60	43	110	0.52
						Yellow poplar-------	93	95	482	1.10
						Eastern white pine--	84	153	---	---
						Virginia pine-------	63	96	---	---
						Black oak-----------	58	41	100	0.49
						Chestnut oak--------	54	38	80	0.44
						Scarlet oak---------	61	44	117	0.54
						White oak-----------	59	42	105	0.51
GuF**:										
Gilpin--------- (North aspect)	4R	Severe	Severe	Slight	Moderate	Northern red oak----	79	61	243	0.80
						Yellow poplar-------	89	88	428	1.01
						Black oak-----------	78	60	236	0.78
						Chestnut oak--------	65	48	145	0.60
						White oak-----------	67	49	177	0.57
						Virginia pine-------	74	114	---	---
Upshur--------- (North aspect)	4R	Severe	Severe	Slight	Severe	Northern red oak----	74	56	208	0.73
						Yellow poplar-------	90	90	440	1.04
						Eastern white pine--	78	143	---	---
						Virginia pine-------	69	107	---	---
						Black oak-----------	74	56	208	0.73
						Chestnut oak--------	66	48	152	0.61
						Scarlet oak---------	71	53	187	0.68
						White oak-----------	69	51	173	0.65

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Average annual growth *: Cubic feet/ac	Average annual growth *: Board feet/ac	Average annual growth *: Cords/ac
GuF**:										
Gilpin (South aspect)	3R	Severe	Severe	Moderate	Moderate	Northern red oak	66	48	152	0.61
						Yellow poplar	90	90	440	1.04
						Black oak	69	51	173	0.65
						Chestnut oak	69	51	173	0.65
						Scarlet oak	73	55	201	0.71
						White oak	66	48	152	0.60
						Virginia pine	68	50	---	---
Upshur (South aspect)	3R	Severe	Severe	Slight	Moderate	Northern red oak	60	43	110	0.52
						Eastern white pine	84	153	---	---
						Virginia pine	63	96	---	---
						Yellow poplar	93	95	482	1.10
						Black oak	58	41	100	0.49
						Chestnut oak	54	38	80	0.44
						Scarlet oak	61	44	117	0.54
						White oak	59	42	105	0.51
Hu Huntington	5A	Slight	Slight	Slight	Severe	Northern red oak	80	67	285	0.88
						Yellow poplar	95	98	510	1.14
KaA, KaB, KnA, KnB Kanawha	4A	Slight	Slight	Slight	Moderate	Northern red oak	80	62	250	0.81
						Black oak	80	62	250	0.81
						White oak	80	62	250	0.81
						Yellow poplar	90	90	440	1.04
						White ash	---	---	---	---
						Black walnut	---	---	---	---
						Black locust	---	---	---	---
LaC Lakin	3S	Slight	Moderate	Moderate	Slight	Northern red oak	60	43	110	0.52
						Virginia pine	60	91	---	---
						Chestnut oak	60	43	110	0.52
						Black oak	60	43	110	0.52
LlD, LlE Lily	3S	Moderate	Moderate	Slight	Moderate	Northern red oak	83	65	271	0.85
						Virginia pine	72	112	---	---
						Black oak	85	67	285	0.88
						White oak	76	58	222	0.75
						Scarlet oak	84	66	278	0.87
						Chestnut oak	76	58	222	0.75
						Yellow poplar	96	100	524	1.15
Lm Lindside	5A	Slight	Slight	Slight	Slight	Northern red oak	86	68	292	0.89
						Yellow poplar	95	98	510	1.14
						Black walnut	---	---	---	---
						White ash	85	---	---	---
						White oak	85	67	285	0.88
						Red maple	---	---	---	---
Lo Lobdell	5A	Slight	Slight	Slight	Severe	Northern red oak	87	69	299	0.91
						Yellow poplar	96	100	524	1.15
						Sugar maple	---	---	---	---
						White ash	---	---	---	---
						White oak	---	---	---	---
						Black cherry	---	---	---	---

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Average annual growth *: Cubic feet/ac	Board feet/ac	Cords/ac
MaB, MaC-------- Markland	4C	Slight	Slight	Severe	Moderate	Northern red oak---- White oak-----------	78 75	57 60	215 236	0.74 0.78
Me-------------- Melvin	5W	Slight	Moderate	Severe	Severe	Pin oak------------- Sweetgum------------ Green ash----------- Hackberry----------- Red maple----------- American elm--------	95 87 --- --- --- ---	77 98 --- --- --- ---	355 --- --- --- --- ---	1.02 --- --- --- --- ---
MoB, MoC-------- Monongahela	4A	Slight	Slight	Slight	Moderate	Northern red oak---- Yellow poplar------- Eastern white pine-- Virginia pine------- White ash----------- Black walnut--------	70 79 72 61 --- ---	52 69 126 93 --- ---	100 309 --- --- --- ---	0.67 0.81 --- --- --- ---
Po-------------- Pope	4A	Slight	Slight	Slight	Severe	Northern red oak---- Yellow poplar------- American beech------ White oak----------- Blackgum------------ American sycamore--- American basswood--- Eastern hemlock----- Bitternut hickory---	80 96 --- 80 --- --- --- --- ---	62 100 --- --- --- --- --- --- ---	250 524 --- --- --- --- --- --- ---	0.81 1.15 --- --- --- --- --- --- ---
SoA, SrB-------- Sensabaugh	4A	Slight	Slight	Slight	Severe	White oak----------- Yellow poplar------- Shortleaf pine------ Virginia pine-------	80 100 80 75	--- --- --- ---	--- --- --- ---	--- --- --- ---
VaD------------- Vandalia (North aspect)	4C	Severe	Severe	Slight	Severe	Northern red oak---- Yellow poplar------- Virginia pine-------	74 100 80	56 107 122	208 580 ---	0.73 1.23 ---
VaD------------- Vandalia (South aspect)	4C	Severe	Severe	Slight	Severe	Northern red oak---- Yellow poplar------- Virginia pine-------	71 103 72	53 112 112	187 622 ---	0.68 1.29 ---
WhB------------- Wheeling	4A	Slight	Slight	Slight	Severe	Northern red oak---- Yellow poplar-------	80 90	62 90	250 440	0.81 1.04

* Average annual growth is equal to total volume growth at rotation divided by rotation age. Actual annual growth varies with stand vigor and other factors. Yield data are based on site indices of natural stands at age 50 years using the International 1/4 Log Rule and standard rough cords. This information should be used for planning only.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
AgC: Allegheny	Regal privet	Silky dogwood, American cranberrybush, Amur privet.	Eastern hemlock, blue spruce, northern white-cedar.	Norway spruce	Austrian pine, pin oak, eastern white pine, sweetgum, sourwood.
AhC*:					
Allegheny	Regal privet	Silky dogwood, American cranberrybush, Amur privet.	Eastern hemlock, blue spruce, northern white-cedar.	Norway spruce	Austrian pine, pin oak, eastern white pine, sweetgum, sourwood.
Urban land.					
AsA, AsB: Ashton	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
Ca, Cg: Chagrin	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
Cm*:					
Chagrin	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
Melvin	Redosier dogwood, bayberry.	Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, blue spruce.	Eastern white pine	Pin oak.
CoB: Coolville	Redosier dogwood, bayberry.	Eastern redcedar, Washington hawthorn, Amur privet, arrowwood, Amur honeysuckle, Tatarian honeysuckle, American cranberrybush.	Austrian pine, green ash, osageorange.	Eastern white pine, pin oak.	---
CtB: Cotaco	Arborvitae	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
DoD: Dormont	Arborvitae	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
GlC, GlD, GlE, GpF Gilpin	Canada yew	Amur privet, burning bush, American cranberrybush, shadblow serviceberry, radiant crabapple eastern redcedar, lilac.	Austrian pine, eastern hemlock, sarvis tree, white pine.	---	Eastern white pine, Norway spruce, black locust.
GuC*, GuC3*, GuD*, GuD3*, GuE*, GuE3*, GuF*:					
Gilpin	Canada yew	Amur privet, burning bush, American cranberrybush, shadblow serviceberry, radiant crabapple eastern redcedar, lilac.	Austrian pine, eastern hemlock, sarvis tree, white pine.	---	Eastern white pine, Norway spruce, black locust.
Upshur	Redosier dogwood, northern white-cedar.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine, sarvis tree, eastern hemlock.	Pin oak	Eastern white pine.
GxD*:					
Gilpin	Canada yew	Lilac, radiant crabapple, eastern redcedar, Amur privet, burning bush, American cranberrybush, shadblow serviceberry.	Austrian pine, eastern hemlock, sarvis tree.	---	Eastern white pine, red pine, Norway spruce, black locust.
Upshur	Redosier dogwood, northern white-cedar.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine, sarvis tree, eastern hemlock.	Pin oak	Eastern white pine.
Urban land.					
Gy Guyan	Regal privet	Medium purple willow, gray silky dogwood, American cranberrybush, redosier dogwood.	Northern white-cedar, Norway spruce, white spruce.	European alder, pin oak, eastern white pine, sweetgum.	---

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
Gz*: Guyan	Regal privet	Medium purple willow, gray dogwood, American cranberrybush, redosier dogwood.	Northern white-cedar, Norway spruce, white spruce.	European alder, pin oak, eastern white pine, sweetgum.	---
Urban land.					
Hu Huntington	Regal privet, sargent crabapple, bayberry.	European burning bush, late lilac, shadblow serviceberry, blackhaw, American cranberrybush.	Eastern hemlock	Norway spruce	Honeylocust, eastern white pine, sugar maple, pin oak, sweetgum.
KaA, KaB, KnA, KnB Kanawha	Regal privet	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce	Sweetgum, sourwood.
KuB*: Kanawha	Regal privet	Eastern redcedar	Eastern hemlock, northern white-cedar.	Norway spruce	Sweetgum, sourwood.
Urban land.					
LaC Lakin	Regal privet	Eastern redbud, lilac, radiant crabapple, eastern redcedar.	Red pine, Austrian pine.	Eastern white pine	---
LlD, LlE Lily	Rhododendron, fragrant sumac, lilac.	Eastern redbud, American mountainash, blackhaw.	Eastern redcedar, Austrian pine, honeylocust.	Eastern hemlock	Black locust.
Lm Lindside	Arborvitae	Silky dogwood, American cranberrybush, Amur privet.	Eastern redcedar, Austrian pine, honeylocust.	Norway spruce	Pin oak, eastern white pine.
Lo Lobdell	Arborvitae	Silky dogwood, Amur privet, American cranberrybush.	Northern white-cedar, Austrian pine, blue spruce.	Norway spruce	Pin oak, eastern white pine.
MaB, MaC Markland	Sargent crabapple	Arrowwood, eastern redcedar, American cranberrybush, Amur privet.	Austrian pine	Eastern white pine, pin oak.	---
Me Melvin	Redosier dogwood	Amur privet, American cranberrybush, silky dogwood.	Northern white-cedar, blue spruce, Austrian pine.	Eastern white pine	Pin oak.

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
MoB, MoC: Monongahela	Arborvitae	American cranberrybush, Amur privet, Tatarian honeysuckle, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
MuC*:					
Monongahela	Arborvitae	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
Urban land.					
Po: Pope	---	Silky dogwood, American cranberrybush, Amur privet.	Blue spruce, northern white-cedar, Austrian pine.	Norway spruce	---
SoA, SrB: Sensabaugh	Arborvitae	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
SvC*:					
Sensabaugh	Arborvitae	Amur privet, American cranberrybush, silky dogwood.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
Vandalia	Northern white-cedar, redosier dogwood.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
Urban land.					
Ud. Udorthents					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
UpC: Upshur	Redosier dogwood, northern white-cedar.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak	Eastern white pine.
Ur*. Urban land					
Us*: Urban land.					
Ashton	Redosier dogwood, bayberry, cedar.	Amur privet, American cranberrybush, silky dogwood, eastern redcedar.	Austrian pine, blue spruce, northern white-cedar.	Norway spruce	Eastern white pine, pin oak.
Lindside	Arborvitae	Silky dogwood, American cranberrybush, Amur privet.	Blue spruce, northern white-cedar, Austrian pine.	Norway spruce	Pin oak, eastern white pine.
UwB*: Urban land.					
Wheeling	Regal privet	Silky dogwood, American cranberrybush, Amur privet.	Blue spruce, northern white-cedar.	Norway spruce	Austrian pine, pin oak, eastern white pine.
VaD: Vandalia	Northern white-cedar, redosier dogwood.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
VuD: Vandalia	Northern white-cedar, redosier dogwood.	American cranberrybush, Amur privet, arrowwood, eastern redcedar.	Austrian pine	Pin oak, eastern white pine.	---
Urban land.					

See footnote at end of table.

TABLE 9.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
WhB--------------- Wheeling	Regal privet------	Silky dogwood, American cranberrybush, Amur privet.	Blue spruce, northern white-cedar.	Norway spruce-----	Austrian pine, pin oak, eastern white pine.
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AgC------------------- Allegheny	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
AhC*:					
Allegheny------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Urban land-----------	Variable--------	Variable--------	Variable--------	Variable--------	Variable.
AsA------------------- Ashton	Severe: flooding.	Slight----------	Slight----------	Slight----------	Slight.
AsB------------------- Ashton	Severe: flooding.	Slight----------	Moderate: slope.	Slight----------	Slight.
Ca, Cg---------------- Chagrin	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: flooding.
Cm*:					
Chagrin--------------	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
Melvin---------------	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CoB------------------- Coolville	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Severe: erodes easily.	Slight.
CtB------------------- Cotaco	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Moderate: wetness.
DoD------------------- Dormont	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GlC------------------- Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.
GlD------------------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GlE------------------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GpF------------------- Gilpin	Severe: slope.	Severe: slope.	Severe: slope, small stones, large stones.	Severe: slope.	Severe: slope.
GuC*:					
Gilpin---------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GuC*:					
Upshur	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GuC3*:					
Gilpin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, thin layer.
Upshur	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: too clayey.
GuD*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GuD3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.	Severe: slope, too clayey.
GuE*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GuE3*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey, erodes easily.	Severe: slope, too clayey.
GuF*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
GxD*:					
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Upshur	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GxD*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Gy Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Gz*:					
Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
Hu Huntington	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
KaA Kanawha	Slight	Slight	Slight	Slight	Slight.
KaB Kanawha	Slight	Slight	Moderate: slope.	Slight	Slight.
KnA Kanawha	Severe: flooding.	Slight	Slight	Slight	Slight.
KnB Kanawha	Severe: flooding.	Slight	Moderate: slope.	Slight	Slight.
KuB*:					
Kanawha	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable.
LaC Lakin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, droughty.
LlD Lily	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
LlE Lily	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lm Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.
Lo Lobdell	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight	Moderate: flooding.
MaB Markland	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
MaC Markland	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Me Melvin	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MoB Monongahela	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
MoC Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Slope	Severe: erodes easily.	Moderate: slope.
MuC*:					
Monongahela	Moderate: wetness, slope.	Moderate: slope, wetness.	Slope	Severe: erodes easily.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
Po Pope	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: flooding.
SoA Sensabaugh	Severe: flooding.	Slight	Moderate: small stones.	Slight	Moderate: flooding.
SrB Sensabaugh	Severe: flooding.	Slight	Moderate: small stones, slope.	Slight	Slight.
SvC*:					
Sensabaugh	Severe: flooding.	Slight	Moderate: small stones, slope.	Slight	Slight.
Vandalia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
Ud Udorthents	Variable	Variable	Variable	Variable	Variable.
UpC Upshur	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Ur* Urban land	Variable	Variable	Variable	Variable	Variable.
Us*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Ashton	Slight	Slight	Slight	Slight	Slight.
Lindside	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Moderate: wetness.	Moderate: flooding.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UwB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Wheeling	Slight	Slight	Moderate: slope.	Slight	Slight.
VaD Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
VuD*:					
Vandalia	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
WhB Wheeling	Slight	Slight	Moderate: slope.	Slight	Slight.
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AgC-----------------Allegheny	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AhC*:										
Allegheny----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land---------	---	---	---	---	---	---	---	---	---	---
AsA-----------------Ashton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AsB-----------------Ashton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ca, Cg--------------Chagrin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Cm*:										
Chagrin------------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Melvin-------------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
CoB-----------------Coolville	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CtB-----------------Cotaco	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
DoD-----------------Dormont	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GlC-----------------Gilpin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GlD-----------------Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GlE-----------------Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GpF-----------------Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
GuC*, GuC3*:										
Gilpin-------------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Upshur-------------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuD*, GuD3*:										
Gilpin-------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
GuD*, GuD3*: Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GuE*, GuE3*: Gilpin	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Very poor.	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GuF*: Gilpin	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Upshur	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
GxD*: Gilpin	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Upshur	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land	---	---	---	---	---	---	---	---	---	---
Gy Guyan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Gz*: Guyan	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Urban land	---	---	---	---	---	---	---	---	---	---
Hu Huntington	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaA Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KaB Kanawha	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KnA Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KnB Kanawha	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
KuB*: Kanawha	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land	---	---	---	---	---	---	---	---	---	---
LaC Lakin	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
LlD----------------- Lily	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LlE----------------- Lily	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lm------------------ Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Lo------------------ Lobdell	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
MaB----------------- Markland	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC----------------- Markland	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Me------------------ Melvin	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
MoB----------------- Monongahela	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MoC----------------- Monongahela	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MuC*:										
Monongahela--------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land---------	---	---	---	---	---	---	---	---	---	---
Po------------------ Pope	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SoA----------------- Sensabaugh	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SrB----------------- Sensabaugh	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SvC*:										
Sensabaugh---------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Vandalia-----------	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land---------	---	---	---	---	---	---	---	---	---	---
Ud. Udorthents										
UpC----------------- Upshur	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ur*----------------- Urban land	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Us*:										
Urban land	---	---	---	---	---	---	---	---	---	---
Ashton	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Lindside	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
UwB*:										
Urban land	---	---	---	---	---	---	---	---	---	---
Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaD Vandalia	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VuD*:										
Vandalia	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land	---	---	---	---	---	---	---	---	---	---
WhB Wheeling	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AgC: Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
AhC*:						
Allegheny	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
AsA, AsB: Ashton	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, frost action.	Slight.
Ca, Cg: Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Cm*:						
Chagrin	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CoB: Coolville	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength, frost action.	Slight.
CtB: Cotaco	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness.
DoD: Dormont	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope.
GlC: Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
GlD, GlE, GpF: Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GuC*:						
Gilpin	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GuC*:						
Upshur-----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.
GuC3*:						
Gilpin-----------	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope, thin layer.
Upshur-----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Severe: too clayey.
GuD*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
GuD3*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope, too clayey.
GuE*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
GuE3*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope, too clayey.
GuF*:						
Gilpin-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur-----------	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
GxD*:						
Gilpin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Upshur	Severe: slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, slippage.	Severe: slope, shrink-swell, low strength.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Gy: Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
Gz*:						
Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength, frost action.	Severe: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Hu: Huntington	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
KaA: Kanawha	Slight	Slight	Slight	Slight	Moderate: low strength, frost action.	Slight.
KaB: Kanawha	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
KnA, KnB: Kanawha	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, low strength, frost action.	Slight.
KuB*:						
Kanawha	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
LaC: Lakin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope, droughty.
LlD, LlE: Lily	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lm: Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Lo: Lobdell	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MaB-----------------Markland	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
MaC-----------------Markland	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
Me------------------Melvin	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
MoB-----------------Monongahela	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness, frost action.	Slight.
MoC-----------------Monongahela	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.
MuC*:						
Monongahela-------	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: slope, low strength, wetness.	Moderate: slope.
Urban land--------	Variable---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Po------------------Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SoA-----------------Sensabaugh	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
SrB-----------------Sensabaugh	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
SvC*:						
Sensabaugh--------	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Vandalia-----------	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope, slippage.	Severe: low strength, shrink-swell.	Moderate: slope.
Urban land--------	Variable---------	Variable---------	Variable---------	Variable---------	Variable---------	Variable.
Ud. Udorthents						
UpC-----------------Upshur	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, low strength.	Moderate: slope.

See footnote at end of table.

TABLE 12.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ur*: Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Us*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Ashton	Slight	Slight	Slight	Slight	Severe: low strength, frost action.	Slight.
Lindside	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Moderate: flooding.
UwB*:						
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
Wheeling	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
VaD: Vandalia	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, shrink-swell.	Severe: slope.
VuD*:						
Vandalia	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Urban land	Variable	Variable	Variable	Variable	Variable	Variable.
WhB: Wheeling	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action, low strength.	Slight.
W*. Water						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AgC: Allegheny	Moderate: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Fair: too clayey, slope.
AhC*:					
Allegheny	Moderate: slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Fair: too clayey, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
AsA, AsB: Ashton	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Fair: too clayey.
Ca, Cg: Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
Cm*:					
Chagrin	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
CoB: Coolville	Severe: wetness, percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, wetness.	Poor: too clayey, hard to pack.
CtB: Cotaco	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage, wetness.	Fair: small stones, wetness.
DoD: Dormont	Severe: wetness, slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: slope.
GlC: Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
GlD, GlE: Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
GpF: Gilpin	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, area reclaim, large stones.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GuC*, GuC3*:					
Gilpin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Upshur	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
GuD*, GuD3*, GuE*, GuE3*, GuF*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
GxD*:					
Gilpin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: slope, area reclaim, thin layer.
Upshur	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope, slippage.	Poor: slope, too clayey, hard to pack.
Urban land	Variable	Variable	Variable	Variable	Variable.
Gy Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Gz*:					
Guyan	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
Hu Huntington	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
KaA, KaB Kanawha	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
KnA, KnB Kanawha	Moderate: flooding.	Severe: seepage, flooding.	Severe: seepage.	Moderate: flooding.	Good.
KuB*:					
Kanawha	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
Urban land	Variable	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LaC: Lakin	Severe: poor filter.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: seepage.	Poor: seepage.
LlD, LlE: Lily	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Lm: Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Lo: Lobdell	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
MaB: Markland	Severe: wetness, percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MaC: Markland	Severe: wetness, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Me: Melvin	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
MoB: Monongahela	Severe: percs slowly, wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Fair: small stones, wetness.
MoC: Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
MuC*:					
Monongahela	Severe: percs slowly, wetness.	Severe: slope, wetness.	Moderate: slope, wetness.	Moderate: slope, wetness.	Fair: small stones, wetness, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
Po: Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
SoA: Sensabaugh	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: small stones.
SrB: Sensabaugh	Moderate: flooding, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 13.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
SvC*:					
Sensabaugh	Moderate: flooding, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: seepage.	Poor: small stones.
Vandalia	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Urban land	Variable	Variable	Variable	Variable	Variable.
Ud. Udorthents					
UpC Upshur	Severe: percs slowly.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Ur* Urban land	Variable	Variable	Variable	Variable	Variable.
Us*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Ashton	Slight	Moderate: seepage.	Slight	Slight	Fair: too clayey.
Lindside	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
UwB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Wheeling	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
VaD Vandalia	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
VuD*:					
Vandalia	Severe: slope, percs slowly, slippage.	Severe: slope.	Severe: slope, too clayey, slippage.	Severe: slope, slippage.	Poor: too clayey, hard to pack, slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
WhB Wheeling	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AgC: Allegheny	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
AhC*:				
Allegheny	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim, slope.
Urban land	Variable	Variable	Variable	Variable.
AsA, AsB: Ashton	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Ca, Cg: Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Cm*:				
Chagrin	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CoB: Coolville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CtB: Cotaco	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
DoD: Dormont	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
GlC: Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
GlD: Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GlE: Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
GpF: Gilpin	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, large stones, small stones.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
GuC*, GuC3*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GuD*, GuD3*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GuE*, GuE3*, GuF*:				
Gilpin	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: slope, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
GxD*:				
Gilpin	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Urban land	Variable	Variable	Variable	Variable.
Gy Guyan	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Gz*:				
Guyan	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Urban land	Variable	Variable	Variable	Variable.
Hu Huntington	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
KaA, KaB, KnA, KnB Kanawha	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
KuB*:				
Kanawha	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Urban land	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LaC: Lakin	Good	Probable	Improbable: excess fines.	Fair: too sandy, slope.
LlD: Lily	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
LlE: Lily	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Lm: Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Lo: Lobdell	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MaB, MaC: Markland	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Me: Melvin	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
MoB: Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MoC: Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
MuC*:				
Monongahela	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, small stones.
Urban land	Variable	Variable	Variable	Variable.
Po: Pope	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
SoA, SrB: Sensabaugh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SvC*:				
Sensabaugh	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Urban land	Variable	Variable	Variable	Variable.
Ud.				
Udorthents	Variable	Variable	Variable	Variable.

See footnote at end of table.

TABLE 14.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UpC: Upshur	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ur*: Urban land	Variable	Variable	Variable	Variable.
Us*:				
Urban land	Variable	Variable	Variable	Variable.
Ashton	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Lindside	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
UwB*:				
Urban land	Variable	Variable	Variable	Variable.
Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
VaD: Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
VuD*:				
Vandalia	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Urban land	Variable	Variable	Variable	Variable.
WhB: Wheeling	Fair: low strength.	Probable	Probable	Fair: small stones.
W*. Water				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Terraces and diversions	Grassed waterways
AgC Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
AhC*:					
Allegheny	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Urban land	Variable	Variable	Variable	Variable	Variable.
AsA, AsB Ashton	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
Ca, Cg Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Cm*:					
Chagrin	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
CoB Coolville	Moderate: depth to rock, slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
CtB Cotaco	Moderate: seepage, slope.	Severe: piping, wetness.	Slope	Erodes easily, wetness.	Erodes easily, droughty.
DoD Dormont	Severe: slope, slippage.	Moderate: piping, large stones, wetness.	Slope, slippage.	Slope, erodes easily, slippage.	Slope, erodes easily.
GlC, GlD, GlE, GpF Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
GuC*, GuC3*, GuD*, GuD3*, GuE*, GuE3*, GuF*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
GxD*:					
Gilpin	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, large stones.	Slope, depth to rock, large stones.
Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
Gy Guyan	Moderate: seepage.	Severe: wetness.	Frost action	Wetness	Wetness.
Gz*:					
Guyan	Moderate: seepage.	Severe: wetness.	Frost action	Wetness	Wetness.
Urban land	Variable	Variable	Variable	Variable	Variable.
Hu Huntington	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
KaA Kanawha	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
KaB Kanawha	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
KnA Kanawha	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
KnB Kanawha	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
KuB*:					
Kanawha	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
Urban land	Variable	Variable	Variable	Variable	Variable.
LaC Lakin	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, too sandy.	Slope, droughty.
LlD Lily	Severe: seepage.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
LlE Lily	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Lm Lindside	Moderate: seepage.	Severe: piping.	Flooding, frost action.	Wetness, erodes easily.	Erodes easily.
Lo Lobdell	Severe: seepage.	Severe: piping.	Flooding, frost action.	Erodes easily, wetness.	Erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MaB: Markland	Moderate: slope.	Severe: hard to pack.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
MaC: Markland	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Me: Melvin	Moderate: seepage.	Severe: piping, wetness.	Flooding	Erodes easily, wetness.	Wetness, erodes easily.
MoB: Monongahela	Moderate: seepage, slope.	Severe: piping.	Percs slowly, slope.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth, percs slowly.
MoC: Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
MuC*:					
Monongahela	Severe: slope.	Severe: piping.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, rooting depth.
Urban land	Variable	Variable	Variable	Variable	Variable.
Po: Pope	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
SoA, SrB: Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones.
SvC*:					
Sensabaugh	Severe: seepage.	Moderate: large stones.	Deep to water	Large stones	Large stones.
Vandalia	Severe: slope, slippage.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
Ud. Udorthents					
UpC: Upshur	Severe: slope, slippage.	Severe: hard to pack.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Ur*: Urban land	Variable	Variable	Variable	Variable	Variable.
Us*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Ashton	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily.
Lindside	Moderate: seepage.	Severe: piping.	Flooding, frost action.	Wetness, erodes easily.	Erodes easily.

See footnote at end of table.

TABLE 15.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
UwB*:					
Urban land	Variable	Variable	Variable	Variable	Variable.
Wheeling	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
VaD Vandalia	Severe: slope, slippage.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.
VuD*:					
Vandalia	Severe: slope, slippage.	Moderate: hard to pack.	Deep to water	Slope, erodes easily.	Slope, erodes easily, percs slowly.
Urban land	Variable	Variable	Variable	Variable	Variable.
WhB Wheeling	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.
W*. Water					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AgC--------------- Allegheny	0-8	Loam-------------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	8-30	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	30-50	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
	50	Weathered bedrock.									
AhC*:											
Allegheny--------	0-8	Loam-------------	ML, CL	A-4	0	90-100	80-100	65-100	55-95	<35	NP-10
	8-30	Clay loam, loam, sandy clay loam.	ML, CL, SM, SC	A-4, A-6	0	90-100	80-100	65-95	35-80	<35	NP-15
	30-50	Clay loam, sandy loam, gravelly sandy loam.	SM, GC, ML, CL	A-4, A-6, A-2, A-1	0-5	65-100	55-100	35-95	20-75	<35	NP-15
	50	Weathered bedrock.									
Urban land------	---		---	---	---	---	---	---	---	---	---
AsA, AsB--------- Ashton	0-10	Silt loam--------	ML	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	10-50	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	80-100	25-42	5-20
	50-65	Silt loam, loam, fine sandy loam.	ML, CL, SM, CL-ML	A-4, A-6	0-5	90-100	85-100	65-95	40-90	<40	NP-20
Ca--------------- Chagrin	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	8-41	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	41-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Cg--------------- Chagrin	0-16	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	16-41	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	41-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Cm*:											
Chagrin----------	0-8	Silt loam--------	ML, CL, CL-ML	A-4	0	95-100	85-100	80-100	70-90	20-35	2-10
	8-41	Silt loam, loam, sandy loam.	ML, SM	A-4, A-2, A-6	0	90-100	75-100	55-90	30-80	20-40	NP-14
	41-65	Stratified silt loam to fine sand.	ML, SM	A-4, A-2	0	85-100	75-100	50-85	15-80	20-40	NP-10
Melvin-----------	0-9	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-27	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
	27-65	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-95	25-40	5-20

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CoB-------------- Coolville	0-8	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0	95-100	90-100	80-100	70-90	24-40	4-12
	8-25	Silty clay loam	CL, ML	A-7, A-6	0	95-100	85-100	80-100	75-95	35-50	15-25
	25-55	Clay, silty clay, silty clay loam.	CH, MH, CL	A-7	0-5	95-100	85-100	80-100	75-95	45-65	20-36
	55	Weathered bedrock	---	---	---	---	---	---	---	---	---
CtB-------------- Cotaco	0-15	Silt loam--------	ML, CL-ML, SM, SM-SC	A-4	0-5	80-100	75-95	55-85	35-80	<30	NP-7
	15-45	Gravelly sandy clay loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-B	0-10	60-100	50-95	40-70	20-70	<35	NP-15
	45-65	Gravelly silt loam, clay loam, loam.	SC, SM, GC, CL	A-2, A-4, A-6, A-1-B	0-10	60-100	50-95	40-70	20-70	<35	NP-15
DoD-------------- Dormont	0-6	Silt loam--------	ML, CL	A-4, A-6	0	75-100	70-100	65-95	50-90	---	---
	6-51	Channery silt loam, channery clay loam, silty clay loam.	ML, CL, SC	A-4, A-6	0-30	75-100	70-95	60-95	45-85	25-40	9-15
	51-65	Very channery loam, channery clay loam, channery silty clay loam.	ML, CL, SC, GC	A-4, A-6, A-7	10-40	65-100	60-95	55-95	40-85	25-50	9-25
GlC, GlD, GlE---- Gilpin	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GpF-------------- Gilpin	0-4	Stony silt loam.	GC, CL, SC, CL-ML	A-2, A-4, A-6	10-40	50-90	45-85	35-75	30-70	20-40	4-15
	4-14	Shaly silt loam, channery loam, silty clay loam.	GM-GC, CL, CL-ML, SC	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
GuC*:											
Gilpin----------	0-7	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	7-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuC*:											
Upshur----------	0-6	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	6-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuC3*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-5	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuD*:											
Gilpin----------	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-5	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	5-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
GuD3*:											
Gilpin----------	0-5	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	5-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuD3*:											
Upshur----------	0-5	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	5-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuE*:											
Gilpin----------	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-4	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	4-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
GuE3*:											
Gilpin----------	0-4	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-4	Silty clay-------	MH, ML, CL	A-7	0	95-100	95-100	90-100	80-100	35-60	15-30
	4-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GuF*:											
Gilpin----------	0-4	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	4-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
GuF*:											
Upshur----------	0-4	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	4-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
GxD*:											
Gilpin----------	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0-5	80-95	75-90	70-85	65-80	20-40	4-15
	6-14	Channery loam, shaly silt loam, silty clay loam.	GC, SC, CL, CL-ML	A-2, A-4, A-6	0-30	50-95	45-90	35-85	30-80	20-40	4-15
	14-38	Channery loam, very channery silt loam, very shaly silty clay loam.	GC, GM-GC	A-1, A-2, A-4, A-6	0-35	25-55	20-50	15-45	15-40	20-40	4-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Upshur----------	0-5	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	5-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land------	---		---	---	---	---	---	---	---	---	---
Gy--------------- Guyan	0-6	Silt loam--------	ML, CL-ML	A-4	0	95-100	95-100	95-100	65-80	20-30	5-10
	6-65	Loam, clay loam, silty clay loam.	ML, CL	A-4, A-6	0	85-100	85-100	80-100	70-95	25-40	8-17
Gz*:											
Guyan-----------	0-6	Silt loam--------	ML, CL-ML	A-4	0	95-100	95-100	95-100	65-80	20-30	5-10
	6-65	Loam, clay loam, silty clay loam.	ML, CL	A-4, A-6	0	85-100	85-100	80-100	70-95	25-40	8-17
Urban land------	---		---	---	---	---	---	---	---	---	---
Hu--------------- Huntington	0-14	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15
	14-65	Silt loam, silty clay loam.	ML, CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-95	25-40	5-15

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KaA, KaB, KnA, KnB------------- Kanawha	0-11	Loam-------------	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	11-65	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
KuB*: Kanawha---------	0-10	Loam-------------	ML, CL, CL-ML	A-4	0	80-100	75-100	65-100	50-90	20-35	2-10
	10-65	Loam, sandy clay loam, clay loam.	SC, CL, ML, SM	A-2, A-4, A-6	0	80-100	75-100	60-100	25-80	20-40	3-15
Urban land------	---		---	---	---	---	---	---	---	---	---
LaC-------------- Lakin	0-10	Loamy sand-------	SM, SM-SC	A-2	0	95-100	95-100	95-100	10-35	<30	NP-7
	10-50	Loamy sand, fine sand, loamy fine sand.	SM, SM-SC, SP-SM	A-2, A-3	0	95-100	95-100	90-100	5-35	<30	NP-7
	50-65	Sand, sandy loam, gravelly sand.	SM, SM-SC, GM, SP-SM	A-1, A-2, A-3	0	40-100	35-100	20-80	5-25	<30	NP-7
LlD, LlE--------- Lily	0-10	Sandy loam-------	SM	A-4, A-2	0-5	90-100	85-100	55-80	25-50	<20	NP-4
	10-30	Clay loam, sandy clay loam, loam.	SM, SC, ML, CL	A-4, A-6	0-5	90-100	85-100	75-100	40-80	<35	3-15
	30-38	Sandy clay loam, clay loam, gravelly sandy clay loam.	SM, SC, ML, CL	A-4, A-2, A-6, A-1-B	0-10	65-100	50-100	40-95	20-75	<35	3-15
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lm--------------- Lindside	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	11-35	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	35-65	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18
Lo--------------- Lobdell	0-5	Silt loam--------	ML, CL-ML, CL	A-4	0	95-100	90-100	80-100	65-90	20-30	NP-8
	5-35	Loam, silt loam	ML	A-4	0	90-100	80-100	70-95	55-85	20-35	NP-10
	35-65	Stratified sandy loam to silt loam.	ML, SM, CL-ML, CL	A-4	0	90-100	80-100	65-85	40-80	15-35	NP-10
MaB, MaC--------- Markland	0-6	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	5-15
	6-34	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	45-60	19-32
	34-65	Stratified clay to silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	90-100	75-95	40-55	15-25
Me--------------- Melvin	0-9	Silt loam--------	CL, CL-ML, ML	A-4	0	95-100	90-100	80-100	80-95	25-35	4-10
	9-27	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	80-100	80-95	25-40	5-20
	27-65	Silt loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	85-100	80-100	70-100	60-95	25-40	5-20

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
MoB, MoC--------- Monongahela	0-6	Loam-------------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	6-23	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	23-56	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	56-65	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
MuC*: Monongahela-----	0-5	Loam-------------	ML, SM, CL-ML, SM-SC	A-4	0-5	90-100	85-100	75-100	45-90	20-35	1-10
	5-23	Silt loam, clay loam, gravelly loam.	ML, CL, CL-ML	A-4, A-6	0-15	90-100	80-100	75-100	70-90	20-40	5-15
	23-56	Silt loam, sandy clay loam, gravelly loam.	ML, CL, SM, SC	A-4, A-6	0-10	80-100	60-100	55-95	45-95	20-40	3-15
	56-65	Silt loam, clay loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	10-20	75-100	60-90	60-85	40-85	20-40	1-15
Urban land------	---		---	---	---	---	---	---	---	---	---
Po--------------- Pope	0-8	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-2, A-4	0	85-100	75-100	51-85	25-55	<20	NP-5
	8-46	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	46-65	Sandy loam, loamy sand.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
SoA, SrB--------- Sensabaugh	0-6	Loam-------------	CL-ML, CL, ML	A-4	0-5	90-100	75-95	65-85	55-75	16-29	3-9
	6-20	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, GC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	20-30	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	5-25	70-90	55-75	45-65	35-55	22-36	6-15
	30-65	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SM-SC, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
SvC*: Sensabaugh------	0-6	Loam-------------	CL-ML, CL, ML	A-4	0-5	90-100	75-95	65-85	55-75	16-29	3-9
	6-20	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	CL-ML, CL, SM-SC, GC	A-4, A-6	2-18	70-95	55-90	45-75	35-65	20-35	5-14
	20-30	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM-SC, SC, GM-GC, GC	A-4, A-6	5-25	70-90	55-75	45-65	35-55	22-36	6-15
	30-65	Gravelly loam, gravelly clay loam, gravelly fine sandy loam.	SM-SC, SC, GM-GC, GC	A-4, A-6, A-2	5-30	55-90	25-75	25-65	20-55	20-36	6-15
SvC*: Vandalia--------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	7-41	Silty clay loam, channery silty clay, clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	41-65	Silty clay, clay, channery silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
Urban land------	---		---	---	---	---	---	---	---	---	---
Ud. Udorthents											
UpC-------------- Upshur	0-6	Silty clay loam	CL, ML	A-6, A-7	0	95-100	95-100	90-100	80-95	35-50	11-25
	6-29	Silty clay, clay	MH, CH, CL	A-7	0	95-100	95-100	90-100	85-100	45-70	20-40
	29-43	Silty clay loam, silty clay, clay.	CL, ML, MH, CH	A-6, A-7	0	80-100	65-100	60-100	55-95	35-55	11-25
	43	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ur*-------------- Urban land	---		---	---	---	---	---	---	---	---	---
Us*: Urban land------	---		---	---	---	---	---	---	---	---	---
Ashton----------	0-10	Silt loam--------	ML	A-4	0	95-100	90-100	75-100	60-95	<35	NP-10
	10-50	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	90-100	85-100	80-100	25-42	5-20
	50-65	Silt loam, loam, fine sandy loam.	ML, CL, SM, CL-ML	A-4, A-6	0-5	90-100	85-100	65-95	40-90	<40	NP-20
Lindside--------	0-11	Silt loam--------	ML, CL, CL-ML	A-4, A-6	0	100	95-100	80-100	55-90	20-35	2-15
	11-35	Silty clay loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	70-95	25-40	4-18
	35-65	Stratified silty clay loam to gravelly sandy loam.	CL, ML, SM, SC	A-2, A-4, A-6	0	60-100	55-100	45-100	30-95	20-40	4-18

See footnote at end of table.

TABLE 16.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
UwB*:											
Urban land------	---		---	---	---	---	---	---	---	---	---
Wheeling--------	0-9	Loam-------------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	9-43	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	43-65	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10
VaD-------------- Vandalia	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	7-41	Silty clay loam, channery silty clay, clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	41-65	Silty clay, clay, channery silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
VuD*:											
Vandalia--------	0-7	Silt loam--------	ML, CL	A-4, A-6, A-7	0-5	80-100	75-100	70-95	50-90	25-45	5-20
	7-41	Silty clay loam, channery silty clay, clay.	CL, CH, ML	A-6, A-7	0-5	75-100	70-95	65-90	60-85	35-55	15-30
	41-65	Silty clay, clay, channery silty clay loam.	CL, CH, ML, MH	A-6, A-7	0-5	70-100	65-100	60-100	55-100	30-55	10-30
Urban land------	---		---	---	---	---	---	---	---	---	---
WhB-------------- Wheeling	0-9	Loam-------------	ML, CL, SM, SC	A-4	0	90-100	90-100	85-100	45-90	15-35	NP-10
	9-43	Silty clay loam, loam, gravelly sandy loam.	ML, CL, SM, SC	A-4, A-6	0-5	90-100	70-100	65-100	45-80	20-40	2-20
	43-65	Stratified very fine sand to very gravelly sand.	GM, SM, GP, GW	A-1, A-2, A-3, A-4	10-20	35-90	20-75	10-65	4-45	<20	NP-10

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
AgC----------------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low-----------	0.32	4	1-4
Allegheny	8-30	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low-----------	0.28		
	30-50	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low-----------	0.28		
	50	---	---	---	---	---	-------------	----		
AhC*:										
Allegheny-------	0-8	15-27	1.20-1.40	0.6-2.0	0.12-0.22	3.6-5.5	Low-----------	0.32	4	1-4
	8-30	18-35	1.20-1.50	0.6-2.0	0.13-0.18	3.6-5.5	Low-----------	0.28		
	30-50	10-35	1.20-1.40	0.6-2.0	0.08-0.17	3.6-5.5	Low-----------	0.28		
	50	---	---	---	---	---	-------------	----		
Urban land------	50	---	---	---	---	---	-------------	----	---	---
AsA, AsB---------	0-10	10-25	1.20-1.40	0.6-2.0	0.16-0.23	5.6-7.3	Low-----------	0.32	5	2-4
Ashton	10-50	18-34	1.20-1.50	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43		
	50-65	10-40	1.25-1.55	0.6-2.0	0.14-0.20	5.6-7.3	Low-----------	0.43		
Ca----------------	0-8	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	5	2-4
Chagrin	8-41	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low-----------	0.32		
	41-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low-----------	0.32		
Cg----------------	0-16	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	5	2-4
Chagrin	16-41	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low-----------	0.32		
	41-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low-----------	0.32		
Cm*:										
Chagrin---------	0-8	10-27	1.20-1.40	0.6-2.0	0.20-0.24	5.6-7.3	Low-----------	0.32	5	2-4
	8-41	18-30	1.20-1.50	0.6-2.0	0.14-0.20	5.6-7.3	Low-----------	0.32		
	41-65	5-25	1.20-1.40	0.6-2.0	0.08-0.20	5.6-7.3	Low-----------	0.32		
Melvin----------	0-9	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43	5	.5-3
	9-27	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43		
	27-65	7-35	1.40-1.70	0.6-2.0	0.16-0.23	6.1-7.3	Low-----------	0.43		
CoB---------------	0-8	17-27	1.30-1.50	0.6-2.0	0.18-0.22	3.6-6.0	Low-----------	0.43	4	1-3
Coolville	8-25	30-40	1.40-1.65	0.6-2.0	0.16-0.19	3.6-5.5	Moderate-----	0.43		
	25-55	35-60	1.50-1.70	0.06-0.2	0.10-0.15	4.5-5.5	Moderate-----	0.32		
	55	---	---	---	---	---	-------------	----		
CtB---------------	0-15	7-27	1.20-1.40	0.6-6.0	0.12-0.20	3.6-5.5	Low-----------	0.37	3	.5-4
Cotaco	15-45	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low-----------	0.28		
	45-65	18-35	1.20-1.50	0.6-2.0	0.07-0.15	3.6-5.5	Low-----------	0.28		
DoD---------------	0-6	18-27	1.20-1.40	0.6-2.0	0.16-0.20	4.5-6.0	Low-----------	0.43	3	2-4
Dormont	6-51	20-40	1.40-1.60	0.2-0.6	0.14-0.18	4.5-6.0	Moderate-----	0.28		
	51-65	20-50	1.30-1.60	0.2-0.6	0.08-0.12	5.1-6.0	Moderate-----	0.28		
G1C, G1D, G1E----	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.32	3	.5-4
Gilpin	6-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	38	---	---	---	---	---	-------------	----		
GpF---------------	0-4	15-27	1.20-1.40	0.6-2.0	0.08-0.14	3.6-5.5	Low-----------	0.24	3	---
Gilpin	4-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low-----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low-----------	0.24		
	38	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
GuC*:										
Gilpin----------	0-7	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	7-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
GuC*:										
Upshur----------	0-6	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	.5-3
	6-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuC3*:										
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-5	40-50	1.30-1.50	0.2-0.6	0.12-0.16	4.5-6.5	High---------	0.32	2	.5-2
	5-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuD*:										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	6-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-5	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	.5-3
	5-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuD3*:										
Gilpin----------	0-5	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	5-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-5	40-50	1.30-1.50	0.2-0.6	0.12-0.16	4.5-6.5	High---------	0.32	2	.5-2
	5-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuE*:										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	6-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-4	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	.5-3
	4-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuE3*:										
Gilpin----------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	4-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
GuE3*:										
Upshur----------	0-4	40-50	1.30-1.50	0.2-0.6	0.12-0.16	4.5-6.5	High---------	0.32	2	.5-2
	4-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GuF*:										
Gilpin----------	0-4	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	4-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-4	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	.5-3
	4-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
GxD*:										
Gilpin----------	0-6	15-27	1.20-1.40	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.32	3	.5-4
	6-14	18-35	1.20-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low----------	0.24		
	14-38	15-35	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.24		
	38	---	---	---	---	---	-------------	----		
Upshur----------	0-5	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate-----	0.37	3	.5-3
	5-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High---------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate-----	0.32		
	43	---	---	---	---	---	-------------	----		
Urban land------	---	---	---	---	---	---	-------------	----	---	---
Gy-------------- Guyan	0-6	12-25	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.0	Low----------	0.32	4	1-3
	6-65	20-35	1.25-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.37		
Gz*:										
Guyan-----------	0-6	12-25	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.0	Low----------	0.32	4	1-3
	6-65	20-35	1.25-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.37		
Urban land------	---	---	---	---	---	---	-------------	----	---	---
Hu-------------- Huntington	0-14	18-30	1.10-1.30	0.6-2.0	0.18-0.24	5.6-7.8	Low----------	0.28	5	3-6
	14-65	18-30	1.30-1.50	0.6-2.0	0.16-0.22	5.6-7.8	Low----------	0.32		
KaA, KaB, KnA, KnB------------- Kanawha	0-11	10-20	1.20-1.40	0.6-2.0	0.16-0.22	5.1-6.0	Low----------	0.32	4	2-4
	11-65	18-35	1.30-1.50	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.28		
KuB*:										
Kanawha---------	0-10	10-20	1.20-1.40	0.6-2.0	0.16-0.22	5.1-6.0	Low----------	0.32	4	2-4
	10-65	18-35	1.30-1.50	0.6-2.0	0.14-0.18	5.1-6.5	Low----------	0.28		
Urban land------	---	---	---	---	---	---	-------------	----	---	---
LaC------------- Lakin	0-10	2-6	1.20-1.40	6.0-20	0.06-0.10	4.5-6.0	Low----------	0.17	5	1-2
	10-50	3-8	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low----------	0.17		
	50-65	1-3	1.30-1.50	6.0-20	0.04-0.08	4.5-6.0	Low----------	0.17		
LlD, LlE--------- Lily	0-10	5-20	1.20-1.40	2.0-6.0	0.09-0.16	3.6-5.5	Low----------	0.28	3	.5-4
	10-30	18-35	1.25-1.35	2.0-6.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	30-38	20-35	1.25-1.35	2.0-6.0	0.08-0.17	3.6-5.5	Low----------	0.17		
	38	---	---	---	---	---	-------------	----		

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Lm---------------- Lindside	0-11	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-6.0	Low-----------	0.32	5	2-4
	11-35	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-6.5	Low-----------	0.37		
	35-65	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-6.5	Low-----------	0.32		
Lo---------------- Lobdell	0-5	15-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.37	5	1-3
	5-35	18-30	1.25-1.60	0.6-2.0	0.17-0.22	5.1-7.3	Low-----------	0.37		
	35-65	15-30	1.20-1.60	0.6-6.0	0.12-0.18	5.6-7.3	Low-----------	0.37		
MaB, MaC---------- Markland	0-6	20-27	1.30-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----------	0.43	3	1-3
	6-34	40-55	1.55-1.70	0.06-0.2	0.11-0.13	5.1-8.4	High----------	0.32		
	34-65	35-50	1.55-1.70	0.06-0.2	0.09-0.11	7.4-8.4	High----------	0.32		
Me---------------- Melvin	0-9	12-17	1.20-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43	5	.5-3
	9-27	12-35	1.30-1.60	0.6-2.0	0.18-0.23	5.6-7.3	Low-----------	0.43		
	27-65	7-35	1.40-1.70	0.6-2.0	0.16-0.23	6.1-7.3	Low-----------	0.43		
MoB, MoC---------- Monongahela	0-6	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low-----------	0.43	3	2-4
	6-23	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.43		
	23-56	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.43		
	56-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low-----------	0.37		
MuC*:										
Monongahela------	0-5	10-27	1.20-1.40	0.6-2.0	0.18-0.24	4.5-5.5	Low-----------	0.43	3	2-4
	5-23	18-35	1.30-1.50	0.6-2.0	0.14-0.18	4.5-5.5	Low-----------	0.43		
	23-56	18-35	1.30-1.60	0.06-0.6	0.08-0.12	4.5-5.5	Low-----------	0.43		
	56-65	10-35	1.20-1.40	0.2-0.6	0.08-0.12	4.5-5.5	Low-----------	0.37		
Urban land------	---	---	---	---	---	---	-------------	----	---	---
Po---------------- Pope	0-8	5-15	1.20-1.40	2.0-6.0	0.10-0.16	3.6-5.5	Low-----------	0.28	5	1-4
	8-46	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low-----------	0.28		
	46-65	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low-----------	0.28		
SoA, SrB---------- Sensabaugh	0-6	8-25	1.25-1.40	0.6-6.0	0.12-0.18	5.6-7.8	Low-----------	0.24	5	1-3
	6-20	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.8	Low-----------	0.20		
	20-30	12-35	1.30-1.50	0.6-6.0	0.10-0.15	5.6-7.8	Low-----------	0.17		
	30-65	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.8	Low-----------	0.17		
SvC*:										
Sensabaugh------	0-6	8-25	1.25-1.40	0.6-6.0	0.12-0.18	5.6-7.8	Low-----------	0.24	5	1-3
	6-20	18-35	1.30-1.50	0.6-6.0	0.10-0.16	5.6-7.8	Low-----------	0.20		
	20-30	12-35	1.30-1.50	0.6-6.0	0.10-0.15	5.6-7.8	Low-----------	0.17		
	30-65	12-38	1.25-1.50	0.6-6.0	0.08-0.14	5.6-7.8	Low-----------	0.17		
Vandalia---------	0-7	20-35	1.20-1.50	0.2-2.0	0.12-0.18	4.5-6.0	Moderate------	0.37	4	1-3
	7-41	35-50	1.30-1.60	0.06-0.2	0.12-0.15	4.5-6.0	High----------	0.32		
	41-65	27-50	1.30-1.60	0.06-0.6	0.08-0.12	5.1-6.5	High----------	0.32		
Urban land------	---	---	---	---	---	---	-------------	----	---	---
Ud. Udorthents										
UpC--------------- Upshur	0-6	27-35	1.20-1.50	0.2-0.6	0.12-0.16	4.5-6.5	Moderate------	0.37	3	.5-3
	6-29	40-55	1.30-1.60	0.06-0.2	0.10-0.14	4.5-6.5	High----------	0.32		
	29-43	27-45	1.30-1.60	0.06-0.2	0.08-0.12	5.1-8.4	Moderate------	0.32		
	43	---	---	---	---	---	-------------	----		
Ur*--------------- Urban land	---	---	---	---	---	---	-------------	----	---	---

See footnote at end of table.

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	G/cc	In/hr	In/in	pH				Pct
Us*:										
Urban land	---	---	---	---	---	---	-----------	----	---	---
Us*:										
Ashton	0-10	10-25	1.20-1.40	0.6-2.0	0.16-0.23	5.6-7.3	Low	0.32	5	2-4
	10-50	18-34	1.20-1.50	0.6-2.0	0.18-0.23	5.6-7.3	Low	0.43		
	50-65	10-40	1.25-1.55	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.43		
Lindside	0-11	15-27	1.20-1.40	0.6-2.0	0.20-0.26	5.1-6.0	Low	0.32	5	2-4
	11-35	18-35	1.20-1.40	0.2-2.0	0.17-0.22	5.1-6.5	Low	0.37		
	35-65	18-35	1.20-1.40	0.2-6.0	0.12-0.18	5.6-6.5	Low	0.32		
UwB*:										
Urban land	---	---	---	---	---	---	-----------	----	---	---
Wheeling	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low	0.37	4	1-3
	9-43	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low	0.32		
	43-65	8-15	1.30-1.50	2.0-6.0	0.04-0.08	5.1-6.0	Low	0.20		
VaD Vandalia	0-7	20-35	1.20-1.50	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.37	4	1-3
	7-41	35-50	1.30-1.60	0.06-0.2	0.12-0.15	4.5-6.0	High	0.32		
	41-65	27-50	1.30-1.60	0.06-0.6	0.08-0.12	5.1-6.5	High	0.32		
VuD*:										
Vandalia	0-7	20-35	1.20-1.50	0.2-2.0	0.12-0.18	4.5-6.0	Moderate	0.37	4	1-3
	7-41	35-50	1.30-1.60	0.06-0.2	0.12-0.15	4.5-6.0	High	0.32		
	41-65	27-50	1.30-1.60	0.06-0.6	0.08-0.12	5.1-6.5	High	0.32		
Urban land	0-6	---	---	---	---	---	-----------	----	---	---
WhB Wheeling	0-9	12-20	1.20-1.40	0.6-6.0	0.12-0.18	5.1-6.0	Low	0.37	4	1-3
	9-43	18-30	1.30-1.50	0.6-2.0	0.08-0.16	5.1-6.0	Low	0.32		
	43-65	8-15	1.30-1.50	2.0-6.0	0.04-0.08	5.1-6.0	Low	0.20		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
AgC----- Allegheny	B	None-----	>6.0	---	---	40-60	Soft	Moderate	Low-----	High.
AhC*:										
Allegheny-----	B	None-----	>6.0	---	---	40-60	Soft	Moderate	Low-----	High.
Urban land-----	-	-----	---	---	---	---	---	---	---	---
AsA, AsB----- Ashton	B	Rare-----	>6.0	---	---	>60	---	High-----	Low-----	Low.
Ca, Cg----- Chagrin	B	Occasional-----	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low-----	Moderate.
Cm*:										
Chagrin-----	B	Frequent-----	4.0-6.0	Apparent	Feb-Mar	>60	---	Moderate	Low-----	Moderate.
Melvin-----	D	Frequent-----	0-1.0	Apparent	Dec-May	>60	---	High-----	High-----	Low.
CoB----- Coolville	C	None-----	1.5-3.0	Perched	Feb-Apr	40-60	Soft	High-----	High-----	High.
CtB----- Cotaco	C	None-----	1.5-2.5	Apparent	Nov-May	>60	---	Moderate	Moderate	High.
DoD----- Dormont	C	None-----	1.5-3.0	Perched	Feb-Mar	>60	---	Moderate	High-----	Moderate.
GlC, GlD, GlE, GpF----- Gilpin	C	None-----	>6.0	---	---	20-40	Soft	Moderate	Low-----	High.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
GuC*, GuC3*, GuD*, GuD3*, GuE*, GuE3*, GuF*:										
Gilpin	C	None	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Upshur	D	None	>6.0	---	---	40-60	Soft	Moderate	High	Moderate.
GxD*:										
Gilpin	C	None	>6.0	---	---	20-40	Soft	Moderate	Low	High.
Upshur	D	None	>6.0	---	---	40-60	Soft	Moderate	High	Moderate.
Urban land	-	---	---	---	---	---	---	---	---	---
Gy Guyan	C	None	0.5-1.5	Apparent	Nov-May	>60	---	High	High	Moderate.
Gz*:										
Guyan	C	None	0.5-1.5	Apparent	Nov-May	>60	---	High	High	Moderate.
Urban land	-	---	---	---	---	---	---	---	---	---
Hu Huntington	B	Occasional	>6.0	---	---	>60	---	High	Low	Moderate.
KaA, KaB Kanawha	B	None	>6.0	---	---	>60	---	Moderate	Low	Moderate.
KnA, KnB Kanawha	B	Rare	>6.0	---	---	>60	---	Moderate	Low	Moderate.
KuB*:										
Kanawha	B	None	>6.0	---	---	>60	---	Moderate	Low	Moderate.
Urban land	-	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
LaC---------------- Lakin	A	None------------	>6.0	---	---	>60	---	Low------	Low------	High.
LlD, LlE---------- Lily	B	None------------	>6.0	---	---	20-40	Hard	Moderate	Moderate	High.
Lm----------------- Lindside	C	Occasional------	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Moderate	Low.
Lo----------------- Lobdell	B	Occasional------	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Low------	Moderate.
MaB, MaC---------- Markland	C	None------------	1.5-3.0	Perched	Mar-Apr	>60	---	Moderate	High-----	Moderate.
Me----------------- Melvin	D	Occasional------	0-1.0	Apparent	Dec-May	>60	---	High-----	High-----	Low.
MoB, MoC---------- Monongahela	C	None------------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High-----	High.
MuC*:										
Monongahela------	C	None------------	1.5-3.0	Perched	Dec-Apr	>60	---	Moderate	High-----	High.
Urban land-------	-	----------------	---	---	---	---	---	---	---	---
Po----------------- Pope	B	Occasional------	>6.0	---	---	>60	---	Moderate	Low------	High.
SoA---------------- Sensabaugh	B	Occasional------	4.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Low.
SrB---------------- Sensabaugh	B	Rare------------	4.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Low.
SvC*:										
Sensabaugh-------	B	Rare------------	4.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Low.
Vandalia----------	D	None------------	4.0-6.0	Perched	Feb-Apr	>60	---	Moderate	High-----	Moderate.

See footnote at end of table.

TABLE 18.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding	High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
			Ft			In				
SvC*:										
Urban land-------	-	----------------	---	---	---	---	---	---	---	---
Ud. Udorthents										
UpC--------------- Upshur	D	None------------	>6.0	---	---	40-60	Soft	Moderate	High-----	Moderate.
Ur*--------------- Urban land	-	----------------	---	---	---	---	---	---	---	---
Us*:										
Urban land-------	-	----------------	---	---	---	---	---	---	---	---
Ashton-----------	B	None------------	>6.0	---	---	>60	---	High-----	Low------	Low.
Lindside---------	C	None------------	1.5-3.0	Apparent	Dec-Apr	>60	---	High-----	Moderate	Low.
UwB*:										
Urban land-------	-	----------------	---	---	---	---	---	---	---	---
Wheeling---------	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
VaD--------------- Vandalia	D	None------------	4.0-6.0	Perched	Feb-Apr	>60	---	Moderate	High-----	Moderate.
VuD*:										
Vandalia---------	D	None------------	4.0-6.0	Perched	Feb-Apr	>60	---	Moderate	High-----	Moderate.
Urban land-------	-	----------------	---	---	---	---	---	---	---	---
WhB--------------- Wheeling	B	None------------	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
W*. Water										

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allegheny	Fine-loamy, mixed, mesic Typic Hapludults
Ashton	Fine-silty, mixed, mesic Mollic Hapludalfs
Chagrin	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Coolville	Fine, mixed, mesic Aquultic Hapludalfs
Cotaco	Fine-loamy, mixed, mesic Aquic Hapludults
Dormont	Fine-loamy, mixed, mesic Ultic Hapludalfs
Gilpin	Fine-loamy, mixed, mesic Typic Hapludults
Guyan	Fine-loamy, mixed, mesic Aeric Ochraquults
Huntington	Fine-silty, mixed, mesic Fluventic Hapludolls
Kanawha	Fine-loamy, mixed, mesic Typic Hapludalfs
Lakin	Mixed, mesic Alfic Udipsamments
Lily	Fine-loamy, siliceous, mesic Typic Hapludults
Lindside	Fine-silty, mixed, mesic Fluvaquentic Eutrochrepts
Lobdell	Fine-loamy, mixed, mesic Fluvaquentic Eutrochrepts
Markland	Fine, mixed, mesic Typic Hapludalfs
Melvin	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Monongahela	Fine-loamy, mixed, mesic Typic Fragiudults
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Sensabaugh	Fine-loamy, mixed, mesic Dystric Fluventic Eutrochrepts
Udorthents	Udorthents
Upshur	Fine, mixed, mesic Typic Hapludalfs
Vandalia	Fine, mixed, mesic Typic Hapludalfs
Wheeling	Fine-loamy, mixed, mesic Ultic Hapludalfs

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